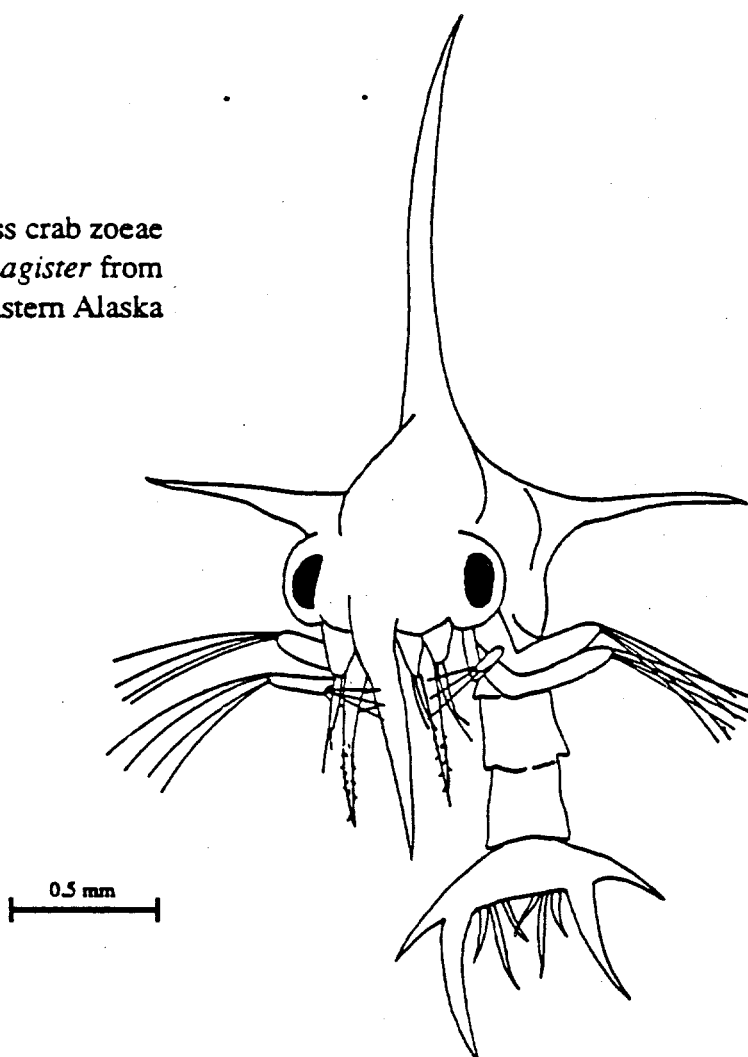


REPORT TO THE BOARD OF FISHERIES

SOUTHEAST ALASKA AND YAKUTAT (REGION 1) 1988/1989 SHELLFISH FISHERIES

First stage Dungeness crab zoeae
Cancer magister from
Southeastern Alaska



Regional Information Report No. 1J89-01

Prepared By:

Alaska Department of Fish and Game
Division of Commercial Fisheries
Juneau, Alaska
January 1989

Cover: Cancer magister. First-stage zoeae from southeastern Alaska.
S.M. Shirley, School of Fisheries and Science, University of
Alaska, Juneau. Published: Marine Biology 95,371-376 (1987).

REPORT TO THE BOARD OF FISHERIES

1988/89 SOUTHEAST ALASKA AND YAKUTAT (REGION I) SHELLFISH FISHERIES

By

Region I Staff

Regional Information Report No.¹ 1J89-01

Alaska Department of Fish and Game
Division of Commercial Fisheries
Juneau, Alaska

January 1989

¹ The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate timely reporting of recently collected information, reports in this series undergo only limited internal review and may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author or the Division of Commercial Fisheries.

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REPORT TO THE BOARD OF FISHERIES
SOUTHEAST ALASKA (STATISTICAL AREA A)

AND

YAKUTAT (STATISTICAL AREA D)

INTRODUCTION

1988/1989

By

Timothy Koeneman

Southeast Region
Alaska Department of Fish and Game
Division of Commercial Fisheries

January 1989

INTRODUCTION

Statistical Area A encompasses all waters surrounding the Alexander Archipelago and the outer coastline northwest to Cape Fairweather. Statistical Area D includes all waters from Cape Fairweather to Cape Suckling. Southeast Alaska and Yakutat waters have been exploited by a broad range of diversified shellfish fisheries utilizing methods ranging from hand-picking with diving gear to ring nets, pots, trawls, and dredges. During the last completed fishery, on either a season or calendar year basis, the significant shellfish fisheries resulted in a harvest of 10.9 million pounds worth an estimated \$14.5 million to the fishermen involved.

Many of the fisheries are in a fairly advanced stage of development, many important fisheries have been stressed by high effort levels, and a few are in the rebuilding stages. Some fisheries are in very early stages of development. In response to the limits of harvest some of these fisheries can reasonably sustain, regulations have become restrictive. In some fisheries it does not appear as if management has been adequately responsive or conservative. During the past six seasons effort levels have increased significantly in many fisheries, and it appears that this trend will continue. Representatives of the fishing industry and representatives of the public are concerned about stock conditions, future fishery potential, and future subsistence and personal harvests. These concerns are evident in some of the regulatory proposals for your consideration.

Shellfish research projects utilized to determine stock condition or to gain necessary biological information relative to Region 1 shellfish fisheries are limited in scope and number. An annual index of abundance survey has been accomplished on red king crab stocks in important bay areas of northern Southeast Alaska since 1978. Red king crab test fishing utilizing commercial vessels and skippers was initiated in 1988 in an attempt to validate Department survey cruises. A pink shrimp and sidestripe shrimp population estimate using the area-swept method was accomplished biennially in Yakutat Bay through 1984. Important fishery information is obtained on a regular basis for most fisheries from the dockside sampling and skipper interview program. Some Tanner crab information has been collected in conjunction with the red king crab index survey. Information on infection rates of Tanner crab by a systematic parasite has been collected for three years from a number of important Tanner crab fishing grounds. Limited spot shrimp and pink shrimp data is being collected and analyzed through dockside sampling and on-board sampling. Dockside sampling and a limited amount of on-board sampling is important to data needs in the Dungeness crab fisheries. Some information relative to various miscellaneous species has been collected. This data includes density and size frequency for abalone and geoduck, and population estimates for geoduck. Additional projects have been written and proposed to gather necessary information in the brown king crab, Tanner crab, Dungeness crab, shrimp trawl, shrimp pot and miscellaneous fisheries. A miscellaneous fishery has been partially funded by the legislature. It does not appear as if other project additions will be funded.

Management, to some degree, is conducted in all fisheries within staff and funding limitations. In those fisheries with available research data and long series of harvest data, concise management plans and strategies are developed.

In other fisheries with less data, management is limited to an analysis of limited historic fishery information, current effort levels, current market conditions, in-season harvest data, and a review of published information related to the species. In these fisheries management is usually limited to identification of serious problems or stock condition declines only after the condition has persisted. Management often entails reacting to problems as appropriately and as quickly as possible to minimize potential resource problems. Often-times management is conservative in nature.

Staff members whose normal full-time assigned duties relate to shellfish fisheries include: Timothy Koeneman, Region 1 Shellfish Biologist located in Petersburg; Catherine Botelho, 11 month Assistant Region 1 Shellfish Biologist, Fishery Biologist II located in Douglas; and Kenneth Imamura, Assistant Area Management Biologist, Fishery Biologist II with duties related to Tanner and Dungeness crab for approximately 6 months, located in Douglas; and Rexanne Eide, Fisheries Technician II port sampler for 6 months, located in Petersburg.

Staff assistance is received from: Paul Larson, Region 1 Fisheries Coordinator, Fishery Biologist IV, located in Douglas; Marianna Alexandersdottir (recently transferred to Anchorage) Regional Biometrician, Biometrician II, located in Douglas; Don House, Assistant Area Management Biologist, Fishery Biologist II, located in Ketchikan;

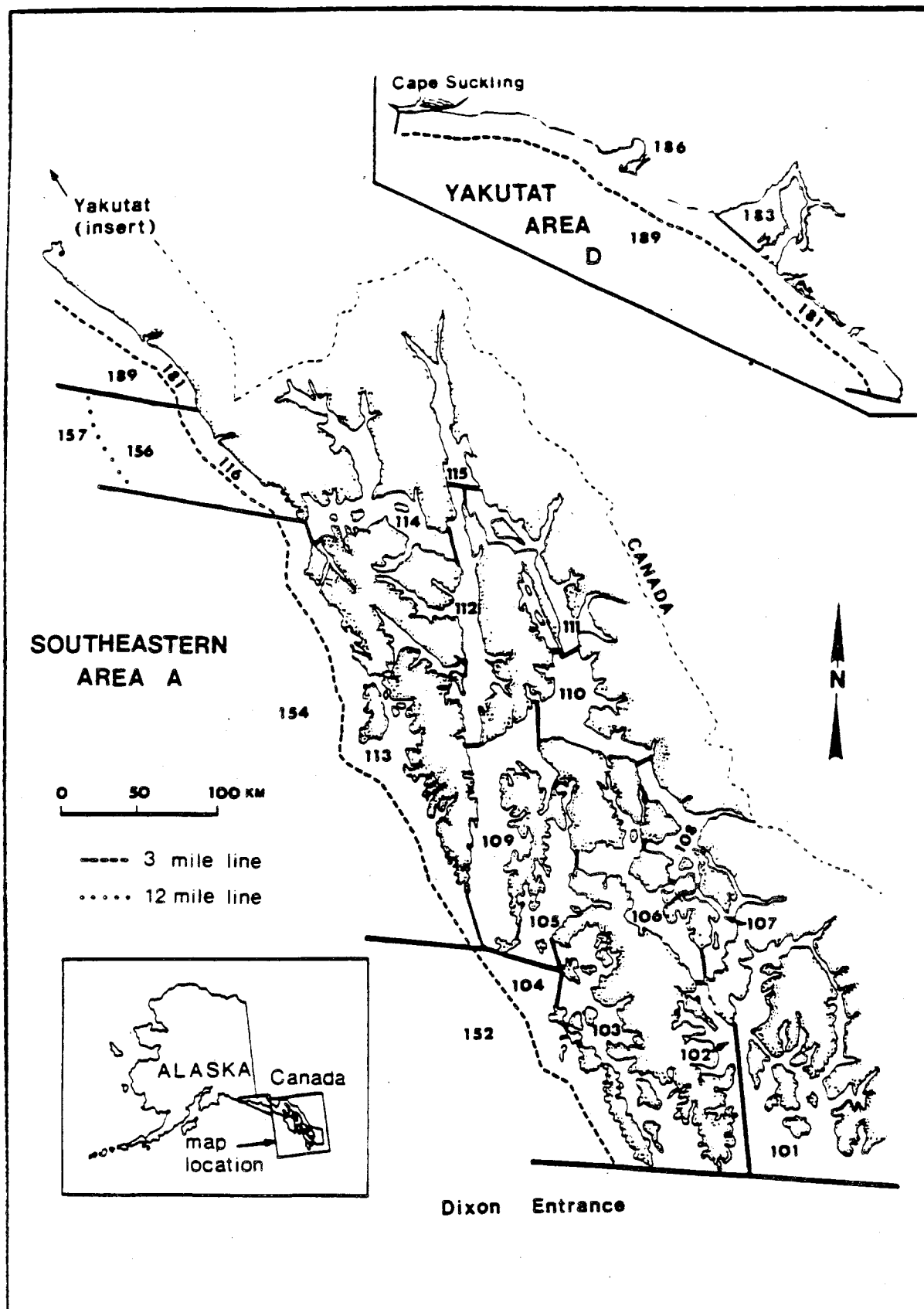


Figure 1. Map of Statistical Area A (Dixon Entrance to Cape Fairweather) and Statistical Area D (Cape Fairweather to Cape Suckling).

REPORT TO THE BOARD OF FISHERIES
SOUTHEAST ALASKA (STATISTICAL AREA A)

AND

YAKUTAT (STATISTICAL AREA D)

KING CRAB

1988/1989

By

Timothy Koeneman

and

Catherine A. Botelho

Southeast Region
Alaska Department of Fish and Game
Division of Commercial Fisheries

January 1989

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BACKGROUND

Commercial king crab fishing in Southeast Alaska was initially documented in 1960 when a small harvest occurred in the Petersburg-Wrangell Management Area. During the early years of 1961 through 1968 regulations provided for a male only fishery, a minimum legal size of 6.5 inches in carapace width, and no closed season. In 1968 a pot limit of 40 pots per vessel was established for Southeast Alaska waters. During this period, harvests averaged 1.1 million pounds from less than 10 vessels per season.

Prior to the 1969/70 season, the minimum legal size was increased to 7.0 inches, a closed season from March 16 to August 14 was established, and pot storage in the water was allowed. In 1970 a quota of 1.5 million pounds was provided for all king crab species combined. The first emergency order was issued in January 1971 when the harvest for the 1970/71 season totaled only 221,000 pounds after 4.5 months of fishing. In 1971 separate red and blue, and brown king crab fisheries were recognized with the adoption of distinct seasons and quotas. Seasons have been altered since that time, and guideline harvest ranges (GHR's) replaced quotas.

With the decline of the larger king crab fisheries in Western Alaska, increased fishing pressure occurred in the Southeast Alaskan king crab fisheries. Management of separate species and stocks occurs as much as possible when information exists. Fish ticket data prior to 1976 did not identify the species of king crab landed. However, area management reports do allow an estimation of the species composition of the total harvest from the 1969/70 through the 1975/76 seasons.

Effective January 1, 1985 a limited entry program was established for the king crab and Tanner crab fisheries in Southeast Alaska by the Alaska Commercial Fisheries Entry Commission, with maximum transferable effort levels of 61 vessels for the red and blue king crab fishery, and 57 vessels for the brown king crab fishery. Additional effort will be present in all king crab fisheries due to the issuance of non-transferable permits. At this time, the number of non-transferable permits is not known. Since the implementation of a moratorium on limited entry by pots, an increase in the use of ring net gear has occurred in the fishery.

Red and Blue King Crab

Red and blue king crab, (*Paralithodes camtschatica*, and *P. platypus*), are primarily harvested in the protected bays, inlets, and adjacent shorelines of the northern waters of Southeast Alaska at depths of less than 150 fathoms. Both standard sideload king crab pots and top-loading tanner crab pots are utilized in the fishery. Important red king crab fishing grounds are located in bays which open into Frederick Sound, Stephens Passage, Seymour Canal, Icy Straits, and Peril Straits. Red king crab are the target species, and small quantities of blue king crab harvested as an incidental species. Since the 1970/71 season, harvests have averaged 436,000 pounds, with an average of 35 vessels participating in the fishery each season. This represented an approximate ex-vessel value of \$375,000.

With the exception of an increase from 40 to 60 pots, and finally to 100 pots, regulations have gradually become more restrictive. During the spring 1988 Board of Fisheries meeting, a modification of the pot

limit occurred. This modification specified that when a minimal harvest of 300,000 to 400,000 pounds was occurring, the pot limit shall be 40 pots per vessel. The fishing season of September 1 through January 31 was established to provide a closure during a portion of the congregation period, the molting and mating season, and the major growth period, after which recovery rates would be acceptable to industry. Industry proposals in recent years have resulted in a later opening date in an attempt to further optimize meat yield or shell fullness. The minimum legal size remains at seven inches of carapace width, with provisions for an eight inch season by emergency order, if warranted by biological conditions and consistency with Board of Fisheries policy. From 1971 through the 1978/79 season, separate red and blue, and brown king crab GHR's were established based upon historic harvest information. From the 1979/80 through 1987/88 seasons, management was based upon results of an annual red king crab stock index of abundance research survey. During an open season, the survey information was utilized to set the appropriate guideline harvest level within the published GHR. Current regulations specify that a minimum of 300,000 pounds must be available to initiate a fishery. Intensification of fishing effort, and additional effort entering the fishery, in combination with declining stock conditions, has resulted in season closures considerably earlier than the regulation closure dates during the most recently opened seasons. Interest in locations outside the normal red king crab fishing areas resulted in an exploratory red king crab fishery implemented by regulation in 1988.

Blue king crab were normally taken under the same regulations utilized in other king crab fisheries. In response to more restricted, and recently closed red king crab fishing seasons, exploratory blue king

crab fishing opportunities in certain locations have been provided beginning with the 1983/84 season. Harvests have been in conjunction with the Tanner crab and brown king crab fisheries. These locations are Glacier Bay, Upper Lynn Canal, Taku Inlet, Port Snettisham, and Holkam Bay. Harvests during the past three seasons have ranged from 1,200 to 1,900 pounds of blue king crab.

Brown King Crab

Brown king crab, (*Lithodes aequispina*), are harvested from deeper waters of the more exposed portions of straits and sounds of the inside waters of Southeast Alaska, generally at depths greater than 100 fathoms but less than 350 fathoms. Important fishing grounds are located at the confluences of Icy Straits, Lynn Canal and Chatham Straits, in Chatham Straits, and in Stephens Passage and Frederick Sound. Participation in this fishery is more demanding than participation in the red king crab fishery due to the factors of greater depths, strong tidal exchanges, strong currents, and more adverse weather conditions. Brown king crab were undoubtedly harvested in significant quantities prior to the 1969/70 season, but to what degree has not been documented. Since the 1970/71 season, harvests of brown king crab have averaged approximately 340,000 pounds per season. This average harvest had an ex-vessel value of approximately \$150,000 per season. Until recently, few vessels participated in this fishery on a regular basis. From 1969/70 through the 1973/74 seasons, brown king crab were regularly harvested from the fishing grounds mentioned above. From 1974/75 through 1979/80 seasons, the fishery was primarily conducted in the Frederick Sound and Stephens Passage grounds.

Since the 1980/81 season, renewed effort for brown king crab developed in other fishing locations. Recent harvests and ex-vessel values have been considerably higher than the long-term averages since 1970/71. Effort has been higher in recent seasons, with very intense fishing occurring in some areas. During the 1987/88 season in Frederick Sound/Stephens Passage, 22 vessels participated in a fishery which harvested approximately 400,000 pounds of brown king crab in 17 days. Briefly, the harvests and closing dates for the 1987/88 fishery are: Frederick Sound Area, 409,687 pounds, closed on February 3, 1988 by Emergency Order (1-M-3-88); Chatham Straits Area, 267,027 pounds, closed on May 27, 1988 by Emergency Order (1-M-9-88); Icy Straits Area, 173,009 pounds, closed on August 21, 1988 by Emergency Order (1-M-17-88). Through September 30, 1988 the harvest from the exploratory fishery totaled 70,308 pounds.

Regulation development in the brown king crab fishery has generally paralleled that in the red king crab fishery, with the exception that the original 1971/72 season of August 1 through March 31 has been gradually lengthened to a 12 month season with special permits issued for the May 1 through September 30 time frame. The special permit provision has not been in effect since the spring 1983 Board of Fisheries meeting. GHR's have been determined using historic harvest information in this fishery. In recent years, the target harvest level within the published GHR has been strongly influenced by population structure information obtained from dockside sampling. During recent seasons an exploratory fishery in fishing locations with relatively low historic harvests of brown king crab has been provided when the traditional fishing locations have been closed.

SEASON SUMMARY

Red and Blue King Crab

The red king crab fishery in Southeast Alaska was scheduled to open by regulation on November 1, 1988. This fishery remained closed for the 1988/89 season, by Emergency Order (1-M-28-88), based upon information collected during the red king crab stock index of abundance research surveys and test fishing conducted with commercial vessels and skippers. This information indicated no appreciable change in stock status. A harvest to meet or exceed the 300,000 pound minimum guideline harvest level was not available and the fishery remained closed.

A summer survey was conducted in 6 bay areas; Gambier Bay, Seymour Canal, Barlow Cove, Excursion Inlet, Port Frederick, and Deadman's Reach. During the fall survey all 10 bay areas were surveyed. The additional areas surveyed in the fall were Pybus Bay, Eagle River, St. James Bay, and Lynn Sisters.

The differences between the summer and fall surveys are varied, dependent upon which bay area and which stock segment is considered. A statistical analysis has not been accomplished. The following discussion concerns average CPUE data and apparent differences may not be statistically significant. When all red king crab are considered: Gambier Bay and Seymour Canal show slightly less crab were captured in the summer than in the fall; in Barlow Cove slightly more crab were captured in the summer when compared to fall values; in Deadman's

Reach, Excursion Inlet, and Port Frederick, there was no discernable difference between summer and fall survey results. When only legal male crab are considered: Seymour Canal is the lone bay area that shows an increased CPUE in the fall; Excursion Inlet indicates a slight decline in CPUE between summer and fall; the other 4 areas have a very similar CPUE between summer and fall. Considering prerecruit male red king crab: Gambier Bay and Seymour show improvements between summer and fall; Barlow Cove indicates a decline in CPUE between summer and fall; Deadman's Reach, Excursion Inlet, and Port Frederick show no differences between summer and fall.

Survey data utilized to make the management decision to continue the closure in the red king crab fishery are presented in Table 11. This table attempts to summarize the harvest history of the fishery from a district perspective. It also includes the most recent survey CPUE data and the historic average survey CPUE data for legal crab. The table indicates that if the current survey CPUE value is considered in light of the highest harvest on record, a potential harvest of approximately 347,000 pounds could be expected. If the current survey CPUE value is considered in light of the average harvest since the 1970/71 season, then a potential harvest of 158,000 pounds could be expected. This table assumes that the CPUE values in the bays surveyed in a district are representative of stock conditions in all the bays in that district, that an average of the survey CPUE value is used when more than one bay within a district is surveyed, and that no adjustment is made when a survey is not conducted in a bay within a district. Another fact indicated in the table is the season of peak and low harvests. Peak harvests in Districts 10 and 11, which in combination contribute approximately 50% of the Region 1 harvest, occurred during the 1973/74 and 1979/80 seasons, respectively.

A comparison of most recent survey CPUE data to average survey CPUE data since 1978 indicates that all bay areas, with the exception of Seymour Canal, currently have relatively low numbers of legal crab. In Seymour Canal, the relatively high number of legal male crab is more a result of good numbers of postrecruit crab rather than increased recruitment. Pre-recruitment males and adult female CPUE values remain relatively low.

A test fishing project utilizing commercial red king crab vessels and experienced skippers was conducted to try and validate survey results in 5 bay areas. The skippers were requested to utilize their own fishing methods and set locations. Skippers were requested to fish in a bay that was surveyed by ADF&G and any other area in fairly close proximity that they wished. Department personnel were on-board each participating vessel. Results from this project also varied, but supported ADF&G survey results. A number of concerns developed during the test fishing process. First, after bids were received it was obvious that not all potential skippers had the desired experience in the 5 bays of interest to ADF&G. Rather than one to three charters of 10 days duration each, it was decided to conduct five charters of 5 days duration each. This proved too restrictive in terms of allowable traveling, fishing, and unloading time. Longer charters in fewer bay areas might have been more beneficial. Second, it is difficult to standardize CPUE data from commercial gear to 24 hour soaks, and directly compare the results to ADF&G data. Statistical comparison may necessarily be limited to size frequency analysis, and distribution. That is, is the commercial fleet fishing on a significantly different "stock" in different grounds than those sampled by ADF&G? Past size frequency comparison of dockside sampling and ADF&G survey

data, and tag return data, suggests that the same "stock" which is being sampled is being harvested by the commercial fleet. One way of evaluating and standardizing commercial effort to ADF&G effort would be through a direct comparison project. Third, it may be necessary to conduct test fishing at other times of the year to more fully understand what is occurring in the stock. During both the ADF&G and test fishing projects, few small crab were captured. Perhaps by test fishing or surveying during January or February, a better assessment of the status of the small size-classes could be accomplished.

Seventeen permits were issued for exploratory red king and Tanner crab fishing between May and early December 1988. Logbook data was returned by only 5 of the participants. Red king crab captured from 205 pot lifts are 48 legals, 1 legal soft, 31 sublegals, 30 females with eggs, and 30 females without eggs. Tanner crab were also captured.

Blue king crab fishing opportunities for the 1988/89 season will occur in portions of Districts 11, 14, and 15 during the brown king crab and Tanner crab fisheries, which are scheduled to open on February 15, 1989.

Brown King Crab

Due to the continued closure of the red king crab fishery, the 1987/88 exploratory will continue until 12:00 noon, January 29, 1989. Through September 1988, the harvest in this fishery totalled 70,308 pounds. Effort since that time has been very light.

The 1988/89 traditional brown king crab fishery will commence on February 15, 1989.

ISSUES

The lack of sufficient biological information to estimate stock abundance, recruitment rates, periods of significant recruitment, molt timing, and other important biological factors are hampering the development of a comprehensive management plan. As more information becomes available from this and other king crab fisheries, it becomes apparent that survival and subsequent recruitment into king crab fisheries are highly variable. Additionally, when a year-class does enter the fishery, which might occur over a 2 to 3 year period, that year-class may be the only significant recruitment to enter the fishery for a period of years thereafter. When recruitment does occur, it must be managed wisely to ensure continued fisheries. Future management, out of necessity, will have to become much more precise, especially with respect to stock, by stock management. Current staff and fund availability will limit our ability to adequately manage on a scientific basis. The effects of fishing on the non-legal portion of the stock must also be examined. The continued high levels of fishing effort that is available will continue to provide a risk of overexploitation when major biological factors are unknown.

Fishermen continue to be concerned about the level of enforcement available during critical times in the fishery. Items of expressed

concern are season openings, season closures, and pot limits. Enforcement of minimum legal size limits in remote processing areas has also been expressed.

With an increase in the number of ring net permits issued, pot fishermen are concerned about the enforcement and allocation ramifications of this fishery. A significant enforcement problem exists when a fishermen operates pot and ring net gear from the same vessel simultaneously. Harvests that occur by ring net gear will be counted towards the guideline harvest level for that fishery. This in turn will reallocate the resource from pot fishermen who hold limited entry pot permits to an unlimited group of ring net fishermen. Regulations on maximum number of ring nets and specific gear definitions have not been promulgated.

Fishermen continue to be concerned about the limited entry program for king and Tanner crab fisheries. A considerable amount of apprehension exists as the number of permanent permits issued, the number of non-transferrable permits issued, and the date of full implementation of the program.

The test fishing program utilized after the index of abundance survey this past fall appeared to work well. However, much more work needs to be accomplished to answer all the concerns of the fleet. Some fleet members that did not participate in the test fishing program feel that participants in the program obtain an advantage. The department has viewed the resulting statistics similar to survey data, and has not released detailed data to the fleet at large.

Exploratory red king crab fishing has not identified significant stocks of red king crab that could be added to the harvest. However, it should be noted that reported effort was limited to 205 pot lifts. Perhaps additional information will be provided in the future.

OUTLOOK

Red King Crab

Index of abundance surveys were initiated in Farragut, Pybus and Gambier Bays during the summer of 1978. In 1979, this survey was expanded to include 18 other bay areas that contributed to the commercial harvest. In 1986 the survey method was adjusted for more precision, and shifted emphasis to 10 major bay areas due to contribution to the fishery and continuity of sample data. Summer and fall surveys were conducted during the past two survey seasons utilizing the new survey method. A small amount of test-fishing was accomplished to validate survey results this past fall. Additional information primarily utilized to assist management includes: fish ticket information, dockside samples, and skipper interviews.

Additional statistical evaluation needs to be accomplished on the available data to fully interpret the survey data. However, a number of statements can be made concerning the data in its present state. The data is presented in average CPUE standardized to a 24 hour soak. First, with the exception of Deadman's Reach and Seymour Canal, all

areas exhibited peak populations between 1979 and 1981, when all red king crab captured are considered. Deadman's Reach and Seymour Canal have had relatively low, but consistent populations throughout the 1978 to 1988 survey period. Second, when populations began to decline, the decline was not limited to the legal segment of the population, but also included the sublegal males, adult females, and juvenile females. Third, very little recovery has been indicated in the data. Gambier Bay and Barlow Cove showed an increase in juvenile females in 1988. An increase in the number of adult females is not evident. A slight increase in the number of prerecruit males is indicated in a few bay areas.

It is not possible to determine the cause and effect relationships that have influenced Southeast Alaska red king crab stocks. General statements can be made based on the survey information above. First, the adult female population is at a very low level. Unless exceptional survival and subsequent recruitment should occur, I would not expect the population of legal crab to appreciably increase for at least the next 4 to 6 years. The potential larval hatch is very low relative to the 1979 through 1981 period. In addition, it is apparent that some areas have significant environmental, disease, or parasite problems. Survey data from Port Frederick and Excursion Inlet indicate that a significant reduction in percent clutch fullness occurred between the summer and fall surveys this year. Clutches of females in Port Frederick appeared relatively healthy in the summer, but exhibited barren or very small clutches of eggs in the fall. Second, it is obvious that either age at recruitment is older than the 4 to 6 years previously thought, or the survival of the larval hatch during the 1979 through 1981 period was very poor. This is evident by the lack of legal crab at the current time even though adult female

abundance was relatively high prior to 1982. Third, survival and growth is variable between areas. Growth information from a 1970 through 1975 tagging program in Southeast Alaska indicates a variability in growth per molt of mature male red king crab between 13 to 20 millimeters. Since Seymour Canal and Deadman's Reach are relatively healthy, and this health has occurred from relatively low numbers of adult females, conditions must favor growth and survival in these areas. Other areas exhibit more variability. Fourth, recruitment events are apparently rare and vary between areas. This is evidenced by the lack of prerecruit and recruit crab during the past 5 years. Incidentally, an examination of the dockside sampling information suggests that good recruitment occurred during the 1977 through 1981 periods. During these four seasons the harvest averaged 471,000 pounds, the average carapace length varied between 155.1 and 156.9 millimeters, and the average weight per crab was 7.3 pounds. Numbers of recruit size crab were available in fair numbers. Prior to that time and after that time, the crab were larger. Fifth, when a significant recruitment event occurs, it will probably be the only significant recruitment event to occur in the fishery for a number of seasons. If continued fishing is an objective of management, then this recruitment event must be managed conservatively, at least until it is apparent that another recruitment event is ready to enter the fishery.

Test fishing was first accomplished during October and November 1988. Results generally supported the survey information. Commercial boats appeared to yield a higher CPUE, but they also utilized very specific pot placement and hanging bait. Areas that showed potential in the survey also showed potential in the test fishery. Areas that were poor in the survey were also poor in the test fishery. Some areas

that fishermen chose to try were also poor. It should be reiterated that fishing time was a constraint on some skippers, and that additional test fishing needs to be conducted during other time frames to clarify the present perception of stock conditions.

In summary, it is apparent that stock conditions are low and are likely to continue at a low level for a number of years to come. Some signs of recovery are evident, but this apparent recovery is limited to a few bay areas. Continued survey and test fishing will be conducted to continue to monitor the situation more closely. Data at this time supports a continued closure for the near future.

Blue King Crab

The fishing opportunities for blue king crab during the last three seasons have not appeared to identify stocks of sufficient size to warrant a significant directed fishery on this species, given present biological information and minimum legal size. Stocks in many glaciated areas, which is the main blue king crab habitat type, have been reported to be heavily infested with a parasitic barnacle, (*Briarosaccus callosus*), that could drastically reduce stock reproduction, growth, and maximum size. These negative effects would tend to prevent the development of large stocks of blue king crab. It may be possible to maintain a small fishery in certain locations, in conjunction with other king and Tanner crab openings. Future management might consider harvesting any infected blue king crab in an attempt to reduce the infection rate in the population, and thereby increase stock reproduction, growth, etc.

Traditional Brown King Crab

Research projects to investigate various biological parameters, distribution, and abundance have not been established. Commercial fishery harvest data can be utilized as an indication of stock strength. Harvests from waters of grounds other than the Frederick Sound-Stephens Passage complex are small compared to historic averages. In addition to the increased dependency upon the Frederick Sound-Stephens Passage stocks, the fishery has been dependent upon the recruit size crab during some seasons. Crab landed during the previous 5 seasons have all averaged below 170 mm in carapace length, and average weight per crab landed was low. Specific landings with average weights below 6 pounds per crab have occurred during past seasons. However, average carapace length and average weight were higher during the past two traditional brown king crab fisheries in Frederick Sound-Stephens Passage. It appears that the smaller crab landed during previous seasons may have represented a fishery based on a relatively strong recruit size class. Small crab noted during the 1984/85 through 1986/87 seasons have now grown and fully recruited into the fishery with significant strength. During the 1970/71 through 1975/76 period, larger crab represented the greater proportion of landed crab. Data from 1987/88 suggests that this trend will repeat itself. However, it must be remembered that effort and resulting harvests were much lower during the earlier fishing seasons.

A conservative approach must be taken towards the management of this fishery with the present effectiveness of the fishing fleet. It is essential that management orient towards "stocks" rather than a general statistical area approach. This will require additional biological information, and altered fishing patterns. Care must be taken to identify strong recruit classes when they enter the fishery, and attempt to hold a portion of these classes for future fishing seasons.

As previously mentioned, biological information necessary for rational resource management of this species is not currently available. If management of this fishery does not become more conservative, then it is possible that the fishery will falter when the next recruit class fails to appear.

Data currently available indicates that the Frederick Sound-Stephens Passage stock (Frederick Sound Area) appears healthy. It is possible that a harvest approaching the upper portion of the new GHR might be appropriate during the 1988/89 season. Data from the Icy Straits-Upper Chatham Straits-Lynn Canal stock (Icy Straits Area) suggest that this area has not recovered from extensive fishing during the 1980/81 through 1983/84 seasons, and a harvest in the mid-range of the GHR is appropriate next year. At this time, it may be too early to determine an appropriate harvest level for the Lower Chatham stock (Chatham Area). All areas combined could be expected to produce a total brown king crab harvest of approximately 900,000 pounds next season.

Exploratory Brown King Crab

During the past exploratory brown king crab fishery, effort concentrated on the Point Gardner to Kingsmill Point line. Brown king crab have been found in areas south of the current line at the latitude of Point Sullivan. Fishing conditions are more rigorous in the southern portion of Chatham Straits. Effort expended in this location in the future may be dependent upon price for brown king crab, other fishing opportunities, and other factors.

Table 1. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) king crab harvest by species, number of landings and number of vessels by year, 1960 to present.

Year/ Season	Red/Blue King Crab	Number of Landings	Number of Vessels	Brown King Crab	Number of Landings	Number of Vessels	Total King Crab	Total ¹ Landings	Total ² Vessels
1960							3,424		
1961							429,600		3
1962							1,289,550		8
1963							1,112,200		8
1964							820,530		9
1965							579,300		7
1966							105,899		8
1967							599,078		7
1968							2,199,772		19
1969							1,899,930	122	39
1969/70	1,438,226			359,567			1,797,793	401	33
1970/71	221,369	151	20	181,142			402,511	150	20
1971/72	391,623	213	18	372,933			764,556	228	18
1972/73	476,761	161	17	265,310	113	10	742,071	236	20
1973/74	640,369	207	27	179,520	92	14	819,889	256	31
1974/75	537,189	201	28	34,451	35	7	571,640	211	30
1975/76	346,341	170	25	68,429	31	5	414,770	191	35
1976/77	328,682	171	36	74,941	30	6	403,623	184	37
1977/78	241,984	144	35	82,733	53	14	324,717	192	39
1978/79	452,064	168	35	49,679	65	10	501,743	213	35
1979/80	670,859	251	43	164,450	80	20	835,309	312	52
1980/81	521,114	199	38	683,298	147	30	1,204,412	307	48
1981/82	537,712	180	48	652,865	255	54	1,190,577	377	67
1982/83	456,907	165	72	799,578	273	69	1,256,485	396	100
1983/84	320,259	139	103	974,917	307	90	1,295,176	411	136
1984/85	276,710	136	98	848,818	277	64	1,125,528	366	165
1985/86 ³	1,886	18	16	698,078	211	61	699,964	217	64
1986/87 ⁴	1,179	15	13	984,520	214	51	985,699	218	53
1987/88 ⁵	1,519	36	19	920,031	218	56	921,550	247	63
1988/89 ⁶									

—Season in Progress—

- ¹ Total landings are the number of unique fish tickets reporting any king crab landings in any combination in a season.
- ² Total vessels are the number of unique OFEC numbers that made landings in a season.
- ³ Red king crab season closed in Southeast Alaska, blue king crab open February 10-24, 1986.
- ⁴ Red king crab season closed in Southeast Alaska, blue king crab open January 15-29, 1987.
- ⁵ Traditional red king crab season closed in Southeast Alaska; experimental red king crab opened July 1, 1988; blue king crab open January 15-February 16, 1988.
- ⁶ Traditional red king crab season closed in Southeast Alaska; experimental red king crab will be open through January 29, 1989; blue king crab and traditional brown king crab will open February 15, 1989.

Table 2. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) red and blue king crab harvests in thousands of pounds by month and season, 1972/73 to present.

Season	Month						Total Landings	Total Vessels
	Sept	Oct	Nov	Dec	Jan	Feb		
1972/73	83.9	117.4	136.2	116.7	22.4	Closed	161	17
1973/74	171.8	228.1	184.0	50.1	6.2	0.1	207	27
1974/75	68.9	117.0	125.4	132.9	92.6	0.3	201	28
1975/76	45.4	111.7	68.6	57.0	59.5	4.1	170	25
1976/77	32.9	94.1	57.4	69.7	67.7	6.9	171	36
1977/78	38.9	43.9	45.3	50.9	57.2	5.7	144	35
1978/79	82.0	105.2	99.2	110.1	55.7	Closed	168	35
1979/80	209.4	182.5	174.3	104.7	Closed	Closed	251	43
1980/81	209.3	147.6	78.1	86.1	Closed	Closed	199	38
1981/82	Closed	327.8	176.3	33.4	Closed	Closed	180	48
1982/83	Closed	420.7	20.3	15.7	0.3	Closed	165	72
1983/84	Closed	Closed	292.9	18.8	7.9	Closed	139	98
1984/85	Closed	268.7	7.0	Closed	Closed	Closed	136	98
1985/86 ¹	Closed	Closed	Closed	Closed	0.0	1.9	18	16
1986/87 ²	Closed	Closed	Closed	Closed	0.9	0.3	15	13
1987/88 ³	Closed	Closed	Closed	Closed	0.4	1.2	36	19
1988/89 ⁴	—Season in Progress—							

¹ Red king crab season closed in Southeast Alaska; blue king crab open February 10-24, 1986.

² Red king crab season closed in Southeast Alaska; blue king crab open January 15-29, 1987.

³ Traditional red king crab season closed in Southeast Alaska; experimental red king crab opened July 1, 1988 in Southeast Alaska; blue king crab open January 15-February 16, 1988.

⁴ Traditional red king crab season closed in Southeast Alaska; experimental red king crab open through January 29, 1989; blue king crab will open February 15, 1989.

Table 3. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) red and blue king crab harvest in thousands of pounds by district and season, 1970/71 to present.

Season	District																Yakutat	Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
1970/71	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	45.2	118.3	130.8	48.6	1.1	0.8	53.8	0.0	0.0	401.8
1971/72	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.0	21.7	231.4	164.4	57.8	95.4	46.2	17.5	0.0	0.0	641.4
1972/73	0.0	0.0	0.0	0.0	0.0	2.1	0.0	16.8	11.2	183.0	109.1	19.0	34.5	95.4	0.0	1.3	4.5	476.9
1973/74	0.0	0.0	0.0	0.0	0.1	0.8	0.3	4.3	21.2	273.4	114.3	25.1	78.4	87.9	34.6	0.0	0.0	640.4
1974/75	0.3	0.0	0.0	0.0	0.0	1.5	0.1	7.6	30.2	124.5	74.1	64.6	102.2	117.0	8.5	0.0	6.6	537.2
1975/76	0.0	0.0	0.0	0.0	0.5	0.1	0.0	15.8	3.2	30.4	35.1	53.4	97.5	103.7	6.7	0.0	0.0	346.4
1976/77	0.0	0.0	1.8	0.0	4.3	6.5	0.0	15.6	17.5	49.3	82.0	12.8	48.7	65.4	24.7	0.0	0.0	328.6
1977/78	1.1	0.0	0.0	0.0	4.6	3.7	0.0	5.3	0.0	43.0	64.4	8.3	68.8	22.2	16.7	0.0	3.9	242.0
1978/79	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.6	0.0	118.5	122.6	14.1	112.5	43.1	29.7	0.0	5.1	452.2
1979/80	0.6	0.0	0.0	0.0	3.6	14.3	0.2	0.5	30.2	168.4	220.2	39.5	79.4	89.1	12.2	0.0	12.5	670.7
1980/81	1.1	0.0	0.0	0.0	0.0	2.8	4.3	27.6	11.8	163.7	172.3	7.9	73.1	5.2	41.4	0.0	9.8	521.1
1981/82	0.0	0.0	0.0	0.0	13.2	4.5	15.0	6.6	0.1	114.4	135.9	32.7	117.5	34.6	53.8	0.0	9.5	537.8
1982/83	0.0	0.0	0.0	0.0	7.3	0.0	1.4	1.5	2.5	77.5	63.7	98.0	70.8	99.4	30.6	0.0	4.1	456.8
1983/84	0.9	0.0	0.6	0.0	1.8	0.9	0.1	0.0	32.1	79.5	37.1	31.3	46.7	81.4	6.6	0.0	1.3	320.3
1984/85	0.8	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.6	58.7	89.9	14.0	51.9	49.7	9.9	0.0	0.0	276.7
1985/86 ¹	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	0.1	0.3	0.0	0.0	1.9
1986/87 ²	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.4	0.3	0.0	0.0	1.2
1987/88 ³	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6	0.0	0.0	0.7	0.0	0.0	0.0	1.5
1988/89 ⁴																		

—Season In Progress—

- 1 Red king crab season closed in Southeast Alaska; blue king crab open February 10-24, 1986.
- 2 Red king crab season closed in Southeast Alaska; blue king crab open January 15-February 29, 1987.
- 3 Red king crab season closed in Southeast Alaska; experimental red king crab opened July 1, 1988 in Southeast Alaska; blue king crab open January 15-February 16, 1988.
- 4 Traditional red king crab season closed; experimental red king crab fishery open through January 29, 1989; blue king crab will open February 15, 1989.

Most recent year's data should be considered preliminary.

Table 4. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) summary of red king crab samples of commercial landings by age/size/class, 1968 to present.

[illegible]

Table 5. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) brown king crab harvests in thousands of pounds by month and season, 1972/73 to present.

Season	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	Landings	Fished
1972/73	18.1	43.7	18.6	22.0	26.3	19.5	35.6	11.0	6.0	11.1	9.6	43.8	265.3	113	10
1973/74	25.6	21.4	15.6	16.5	12.2	24.6	30.9	15.5	0.0	0.0	3.2	13.9	179.4	92	14
1974/75	8.9	4.9	3.2	4.5	1.4	2.8	3.8	0.0	0.0	0.0	0.0	5.0	34.5	35	7
1975/76	16.1	4.8	7.9	13.2	1.4	13.2	1.7	0.3	0.0	0.0	2.6	7.0	68.2	21	5
1976/77	12.0	9.1	8.5	10.3	11.5	9.1	7.5	0.0	0.0	0.0	0.0	7.0	75.0	30	6
1977/78	9.6	7.2	15.1	13.5	10.0	11.7	14.3	0.0	0.0	0.0	0.0	1.3	82.7	53	14
1978/79	5.9	4.4	8.7	9.7	5.9	5.9	3.7	0.1	0.0	0.0	2.2	3.3	49.8	65	10
1979/80	4.7	8.9	5.6	9.0	16.5	34.8	44.9	10.4	6.8	8.8	0.0	13.9	164.3	80	20
1980/81	30.2	43.2	18.2	79.3	168.7	167.7	85.3	19.1	32.1	15.2	10.4	14.0	683.4	147	30
1981/82	43.0	41.7	44.0	17.9	65.8	80.9	70.7	20.9	82.0	70.0	55.8	60.2	652.9	255	54
1982/83	173.5	77.3	65.3	0.0	115.8	159.3	15.0	46.8	27.5	35.2	59.8	24.0	799.5	273	69
1983/84	23.7	52.8	11.0	33.7	152.7	303.5	287.7	53.4	32.2	11.0	6.9	6.3	974.9	307	90
1984/85	166.9	250.8	19.9	14.9	117.8	172.5	22.3	19.6	24.9	8.1	19.1	11.9	848.7	277	124
1985/86	39.8	53.8	41.1	32.1	240.4	249.5	8.6	4.5	14.7	1.4	3.4	9.0	698.3	211	61
1986/87	147.5	80.0	46.3	326.2	136.4	70.5	67.9	39.3	38.9	0.0	13.5	18.0	984.5	214	51
1987/88	13.0	0.0	8.0	263.1	297.4	80.2	64.0	79.0	64.0	29.3	20.1	2.0	920.1	218	56
1988/89 ¹	Season In Progress														

¹ Most recent year's data should be considered preliminary.

Table 6. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) brown king crab harvests in thousands of pounds by district and season, 1972/73 to present.

Season	District																	Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	183	
1972/73	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	10.5	186.5	36.2	5.8	0.0	2.6	23.4	0.0	0.0	265.4
1973/74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	149.2	24.6	0.0	0.6	4.1	0.4	0.0	0.0	179.5
1974/75	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	14.9	12.3	0.7	5.2	0.0	1.4	0.1	0.0	0.0	34.7
1975/76	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	58.8	0.0	1.3	3.5	0.8	3.5	0.0	0.0	68.5
1976/77	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.6	65.8	1.1	0.1	0.0	0.0	0.2	0.0	0.0	75.8
1977/78	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	73.7	7.3	0.6	0.3	0.0	0.7	0.0	0.0	82.7
1978/79	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.7	6.7	1.3	0.0	0.5	4.6	0.0	0.0	49.8
1979/80	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	61.3	21.8	61.8	0.0	0.3	16.7	0.0	1.4	164.4
1980/81	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.2	6.4	204.6	25.9	169.7	0.1	221.7	53.6	0.0	0.0	683.2
1981/82	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.1	48.8	248.0	48.8	92.9	6.2	152.6	49.4	0.0	0.0	652.8
1982/83	0.0	0.0	0.0	0.0	0.0	13.9	10.2	7.3	109.2	185.7	52.6	225.8	12.9	144.0	37.9	0.0	0.0	799.5
1983/84	0.0	0.0	0.0	0.0	0.0	3.2	5.4	5.4	135.0	222.7	24.6	438.2	0.1	46.5	93.9	0.0	0.0	975.0
1984/85	0.0	5.1	0.0	0.0	0.0	4.5	14.1	0.1	192.3	375.9	34.5	153.3	2.5	52.8	13.1	0.6	0.0	848.8
1985/86	0.0	4.0	0.6	0.0	0.0	17.6	3.7	4.6	234.0	324.4	35.6	23.3	0.1	24.8	25.3	0.0	0.0	698.0
1986/87	1.6	0.0	0.0	0.0	0.0	10.9	9.4	0.0	580.0	298.8	43.8	22.4	0.0	1.5	16.2	0.0	0.0	984.6
1987/88	0.0	0.0	0.0	0.0	0.0	4.8	7.7	0.0	275.5	318.6	36.9	193.4	0.0	16.4	66.6	0.0	0.0	919.9
1988/89 ¹	Season In Progress																	

¹ Most recent year's data should be considered preliminary

Table 7. Statistical Area A (Southeast) summary of brown king crab dockside samples from 1970/71 to present.

Season	Number of Landings Sampled	Number of Crab Sampled	Average Carapace Length (mm)
1969/70	4	172	163.2
1970/71	12	1,132	174.5
1971/72	18	1,894	175.2
1972/73	10	1,153	174.4
1973/74	8	605	173.6
1974/75	2	104	170.4
1975/76	9	940	171.8
1976/77	2	150	168.5
1977/78	8	727	170.0
1978/79	6	498	171.0
1979/80	6	478	169.8
1980/81	20	1,304	171.6
1981/82	5	712	175.4
1982/83	18	1,489	169.5
1983/84	10	703	169.6
1984/85	12	1,368	165.3
1985/86	17	1,765	166.6
1986/87	43	4,488	167.9
1987/88	58	5,338	173.4
1988/89 ¹			
Average	14	1,317	171.0

¹ Most recent year's data should be considered preliminary; season scheduled to begin on February 15, 1989.

Table 8a. Statistical Area A (Southeast Alaska) comparison of historic red king crab indexing data, 1979 to 1986¹.

	1979	1980	1981	1982	1983	1984	1985	1986
Number of Pot Lifts	320	295	371	414	390	378	385	469
Red King Crab								
No. females captured	5,140	2,611	5,009	4,079	2,933	2,325	2,079	2,396
No. males captured	4,288	3,217	4,475	2,386	2,439	2,090	1,490	2,345
No. legals captured	1,134	829	998	951	828	917	528	689
No. sublegals captured	3,154	2,388	3,477	1,435	1,611	1,174	963	1,655
Tanner Crab								
No. females captured	902	732	977	2,026	1,322	683	1,278	1,967
No. males captured	1,628	3,309	5,771	4,819	3,695	2,464	4,834	5,128
No. legals captured	803	1,766	3,573	2,435	1,897	995	1,992	2,000
No. sublegals captured	825	1,543	2,198	2,384	1,798	1,468	2,842	
Halibut ⁴								
No. captured	204	369	574	848	623	779	802	785
No. legals captured	86	163	248	320	203	316	285	323
Avg. length (cm)	78.2	79.1	79.1	77.4	75.7	77.8	78.3	82.6
Avg. weight (kg) ²	5.8	5.8	5.8	5.2	5.2	5.2	5.8	6.8
Pacific Cod ⁴								
No. captured	79	166	246	537	287	449	390	390
Avg. length (cm)	71.8	67.8	64.9	65.0	62.4	64.7	64.2	62.7
Avg. weight (kg) ³	4.5	3.7	3.3	3.3	2.9	3.2	3.2	2.9

1 Crab data is standardized to 24 hour soak.

2 Utilized IFHC table to convert length in cm to round weight in kg.

3 Utilized $\log_{10} W = 3.1 \log_{10} L - 2.103462$ from Ketchen, 1967 FRBC Tech. Report No. 23.

4 Halibut and pacific cod catches are unstandardized.

Table 8b. Statistical Area A (Southeast Alaska) comparison of historic red king crab indexing data, 1987 to present¹.

	1987 ⁵ Summer	1987 ⁵ Fall	1988 ⁶ Summer	1988 ⁶ Fall
Number of Pot Lifts	197	157	272	352
Red King Crab				
No. females captured	1,647	740	1,255	1,754
No. males captured	1,110	847	1,449	1,860
No. legal s captured	264	161	223	309
No. sublegals captured	846	686	1,227	1,551
Tanner Crab				
No. females captured	992	468	1,234	1,357
No. males captured	2,862	1,330	3,741	4,221
No. legal s captured	1,365	531	1,867	2,393
No. sublegals captured	1,497	799	1,874	1,828
Halibut ⁴				
No. captured	307	158	332	305
No. legal s captured	101	44	125	106
Avg. length (cm)	78.4	75.6	78.1	75.0
Avg. weight (kg) ²	5.5	5.1	5.7	5.0
Pacific Cod ⁴				
No. captured	225	326	235	395
Avg. length (cm)	62.1	58.4	61.8	60.1
Avg. weight (kg) ³	2.9	2.4	2.8	2.6

1 Crab data is standardized to 24 hour soak.

2 Utilized IFHC table to convert length in cm to round weight in kg.

3 Utilized $\log_{10} W=3.1 \log_{10} L-2.103462$ from Ketchen, 1967 FRBC Tech. Report No. 23.

4 Halibut and pacific cod catches are unstandardized.

5 Partial surveys were conducted in July and October of 1987.

6 Partial survey in June and July of 1988 in six bays; full survey of ten bays in September and October of 1988.

Table 9. Statistical Area A (Southeast Alaska) summary of standardized red king crab index data in percent by size/age class, 1979 to present.

Year	Sample Size	Prerecruits				Recruits	Post-Recruits
		Fours	Threes	Twos	Ones		
1979	4,288	7.42	19.23	27.40	23.27	16.01	6.7
1980	3,217	7.19	12.19	20.40	30.46	19.66	10.1
1981	4,475	6.31	17.14	24.71	27.93	16.14	7.8
1982	2,386	3.41	10.53	19.63	27.60	19.49	19.4
1983	2,439	6.08	12.64	29.23	26.22	17.14	8.7
1984	2,090	3.46	9.93	16.58	32.98	22.16	14.9
1985	1,490	7.86	16.19	19.76	28.57	15.24	12.4
1986 ¹	2,345	24.50	23.07	18.62	15.18	8.98	9.7
1987 ²							
Summer	1,110	8.19	20.97	24.74	20.76	15.87	9.5
Fall	847	26.17	22.00	20.05	15.48	9.24	7.1
1988 ³							
Summer	1,449	25.0	25.33	21.89	12.47	8.96	6.39
Fall	1,860	37.89	20.45	14.81	10.22	9.75	6.88

¹ The survey design was changed in 1986 and new areas added.

² These statistics are not directly comparable to 1979-86 data because only partial surveys were conducted. Four bays were surveyed in the summer and two in the autumn.

³ These statistics are not directly comparable to 1979-86 data because only a partial survey of six bays occurred in summer of 1988 and a full survey of ten bays occurred in fall of 1988.

Table 10. Statistical Area A (Southeast Alaska) comparison of standardized index data and commercial sampling data of red king crab, 1979 to present.

Year	Sample Size	Number of Pot Lifts	Number of Sublegals	Standardized Index Data			Proportion of Recruits In Legal Pop.	Proportion of Postrecruits In Legal Pop.
				Number of Legals	Number of Recruits	Number of Postrecruits		
1979	4,288	320	3,154	1,134	707	426	0.6235	0.3765
1980	3,217	295	2,388	829	519	311	0.6261	0.3739
1981	4,475	371	3,477	998	670	328	0.6713	0.3287
1982	2,386	414	1,435	951	576	374	0.6057	0.3943
1983	2,439	389	1,611	828	474	354	0.5725	0.4275
1984	2,090	378	1,174	917	490	427	0.5344	0.4656
1985	1,490	385	963	528	267	261	0.5057	0.4943
1986 ¹	2,345	469	1,655	689	322	367	0.4673	0.5327
1987 ¹								
Summer	1,110	197	846	264	171	93	0.6477	0.3523
Autumn	847	157	686	161	83	78	0.5155	0.4845
Average							0.5862	0.4138

Season	Sample Size	Number Less than 145 mm	Number Greater than 145 mm	Commercial Dockside Sampling Data		Proportion of Recruits In Legal Pop.	Proportion of Postrecruits In Legal Pop.
				Number of Recruits	Number of Postrecruits		
1979/80	3,495	170	3,325	2,032	1,282	0.6111	0.3889
1980/81	4,235	254	3,981	2,368	1,613	0.5948	0.4052
1981/82	3,413	117	3,296	1,670	1,626	0.5067	0.4933
1982/83	2,808	104	2,704	1,358	1,346	0.5022	0.4978
1983/84	3,566	154	3,412	1,956	1,456	0.5733	0.4267
1984/85	2,238	67	2,171	980	1,191	0.4514	0.5486
1985/86	Red King Crab Season Closed						
1986/87	Red King Crab Season Closed						
1987/88	Red King Crab Season Closed						
Average						0.5487	0.4513

¹ In 1987 partial surveys were conducted during summer in four bays and during autumn in two bays. These statistics cannot be directly compared to the full summer surveys of 1979-1986.

NOTE: Legal population is all males greater than or equal to 145 mm in carapace length.

Table 11. Statistical Area A (Southeast Alaska) Summary of red king crab harvest data since 1970/71 season, and projected harvests using data from last completed abundance survey.

Dist.	High Harvest	High Year	Low Harvest	Low Year	Avg. Harvest	Index Bay Locations	Percent Relative Index Value	Potential Harvest High	Potential Harvest Low	Potential Harvest Average
1-7	32.7	81/82	0.6	75/76	8.4	None	100	32.7	0.6	8.4
8	27.6	80/81	0.5	79/80	9.1	None	100	27.6	0.5	9.1
9	45.2	70/71	0.1	81/82	17.5	None	100	45.2	0.1	17.5
10	273.4	73/74	30.4	75/76	122.3	Pyb/Gamb.	6.81	18.6	2.1	8.3
11	220.2	79/80	35.1	75/76	107.7	Sey/Bar/Eagle	62.54	137.7	22.0	67.4
12	98	82/83	7.9	80/81	35.1	Lynn SIs	5.21	5.1	0.4	1.8
13	117.5	81/82	34.5	72/73	71.9	Deadmans	38.8	44.9	13.2	27.5
14	117	74/75	5.2	80/81	62.7	Exc/Port Fred.	16.59	19.4	0.9	10.4
15	53.8	81/82	6.6	83/84	24.8	St. James/Eagle	26.22	14.1	1.7	6.5
16	1.3	72/73	1.3	72/73	1.3	None	100	1.3	1.3	1.3
Total	986.7		122.2		460.8			346.6	42.7	158.2

ASSUMPTIONS: Stock condition in bays surveyed are representative of all bays in that district, where more than one bay represents a district they contribute equally to the commercial harvest.

RELATIVE INDEX VALUE Determined by formula: Last Index survey CPUE Value of Legal Crab - divided by - Average Index Survey CPUE Value - times - 100.

Pybus Bay	=	0/2.01 X 100 =	0	Pybus/Gambler	Average =	6.81
Gambler Bay	=	0.66/4.85 X 100 =	13.61	Seymour/Barlow/Eagle	Average =	62.54
Seymour Canal	=	3.16/1.94 X 100 =	162.89	St. James/Eagle	Average =	26.22
Barlow Cove	=	0.73/3.97 X 100 =	18.39	Exc/Port Fred.	Average =	16.59
Eagle River	=	0.09/1.42 X 100 =	6.34			
St. James Bay	=	0.95/2.06 X 100 =	46.1			
Lynn Sisters	=	0.15/2.88 X 100 =	5.21			
Excursion Inlet	=	0.04/1.08 X 100 =	3.70			
Port Frederick	=	0.61/2.07 X 100 =	29.47			
Deadmans Reach	=	0.63/1.65 X 100 =	38.18			

REPORT TO THE BOARD OF FISHERIES
SOUTHEAST ALASKA (STATISTICAL AREA A)

AND

YAKUTAT (STATISTICAL AREA D)

TANNER CRAB

1988/1989

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BACKGROUND

Two commercially significant species of Tanner crab (*Chionoecetes bairdi* and *C. opilio*) are harvested from Alaskan waters. Only *C. bairdi* is known to be present in Region 1 (Statistical Areas A and D). Statistical Area A encompasses the State waters of Southeastern Alaska's Alexander Archipelago between Dixon Entrance and Cape Fairweather. Statistical Area A is divided into Districts 1 to 16, generally south to north. Statistical Area D covers the State waters between Cape Fairweather and Cape Suckling. Statistical Area D is divided into Districts 81 to 91, generally east to west. The fleet characteristics and populations of many commercial shellfish and finfish are distinctly different in these two areas. Although separate fishing seasons and guideline harvest levels have been established for most species for each area, commercial shellfish fisheries for both areas are managed by Region 1 staff.

Yakutat Fishery

The Yakutat fishing area (Statistical Area D) is characterized by exposed waters of the eastern Gulf of Alaska. It is a nonexclusive registration area. Historically, this Tanner crab fishery attracted larger, long-range vessels with large live tanks in which tons of crabs could be kept for extended periods of time. Many were also engaged in fisheries for other species of shellfish in other areas of the state. These vessels generally used side-loading king crab pots wrapped with smaller mesh for the Tanner fishery.

With the advent of the regulation prohibiting the use of side-loading pots in the Yakutat Tanner fishery in 1983, some of these vessels may have decided that investment in top-loading gear was not economically justifiable for entry into this relatively low volume fishery.

For the previous four seasons, only small, local vessels operating out of Yakutat opted to enter the fishery. During the early spring opening in 1987, five larger vessels based in Kodiak, Valdez and Pelican also registered for this fishery. Only two of these landed crab. Their lack of success discouraged the remaining three registered vessels from actively participating in the fishery. In 1988, only one larger boat and several smaller vessels fishing around Yakutat Bay entered the fishery. Their catches provided no indication of resurgence in Tanner crab populations in Statistical Area D.

Southeast Alaska Fishery

The Southeastern Alaska fishing area (Statistical Area A) consists of the relatively protected inshore waters south and east of Cape Fairweather and north of Dixon Entrance. Statistical Area A is a superexclusive registration area. Over the past five seasons, the most recent three of which have been under a moratorium on issuance of new permits, this fishery has supported a fleet of about 90 vessels. Most are small, ranging in size between 35 to 50 feet keel length. There are a few vessels with keel lengths up to 70 feet also in the fishery. Most of these vessels are designed and used primarily for other fisheries, such as summer fisheries for salmon and halibut.

Winter crabbing is generally a secondary source of income during the off season. Most of these vessels are at least temporarily equipped with live-tanking capabilities for the crabbing season.

Much of the gear used is stacking conical or pyramid (nesting) gear which takes up less deck space than the traditional (non-nesting) seven-foot square king crab pots that are also used by some operators. The effectiveness of stacking gear may be comparable to that of the heavier square pots for Tanner crab, and the gear is lighter and easier to handle and stow on smaller vessels. There is probably a tendency for the larger vessels to use square, side-loading pots because the larger vessels have the deck space to accommodate this type of gear. Some crabbers also believe that the heavier square pots fish more effectively, at least for king crab.

Choice of gear type may then be dictated to some extent by whether only Tanner crab or a combination of Tanner crab and king crab will be targeted during a combined opening for these species. The most recent trend toward increasingly shorter seasons has favored the use of stacking gear.

HISTORICAL REVIEW

Historic Region 1 (Statistical Areas A and D) Tanner crab landings are shown in Table 1. Although Tanner crab landings were reported in the Southeastern area in the early 1960's, it was not until the early

1970's that intensive fisheries were conducted in either the Southeastern or Yakutat areas. Tanner crab were commonly discarded by crabbers fishing for other species because they brought low prices well into the mid-1970's.

Tanner crab landings averaged approximately 1.5 million pounds in the Yakutat fishery between the 1972/73 and 1979/80 seasons. Following a record catch of approximately 2.4 million pounds during the 1979/80 season the harvest of Tanner crab there has declined. Although most of the harvest has historically occurred between the months of February and April (Table 2), the season was longer during the earlier years of the fishery. The season currently extends between January 15 and May 1, reflecting the trends of harvest set during the earlier years of the fishery.

The Southeast Alaska Tanner crab fishery has produced an average annual harvest of approximately 1.7 million pounds since the 1972/73 season. During this period seasonal landings ranged from 0.8 to 2.5 million pounds. Most of the harvest has historically been taken during the January through April period in Districts 10, 11, and 14. These districts correspond approximately to Frederick Sound, Stephens Passage, and Icy Straits. In each of the last five seasons, the fishery has lasted no longer than two months and is becoming progressively shorter.

In the 1981/82 season that extended from December of 1981 to mid-April of 1982, 2.8 million pounds of Tanner crab, a record, were harvested by 46 vessels. More than half of this total was landed from the Icy Straits area in District 14. Climbing demand for Tanner crab, an

earlier season opening in Southeast Alaska than in fishing areas further northward and westward, an open registration status, and the record landing led to a doubling of the number of vessels fishing the following season in 1982/83.

The effort expended in Icy Straits was unprecedented (Tables 1 and 4). The season, which closed in two weeks, was the shortest on record. The fishing effort in bays and on the better grounds in Icy Straits was extreme. As a result of this, several measures to prevent a recurrence were pursued by both the department and the industry.

The season was changed by the Board of Fisheries early in 1983 so its opening date coincided with those elsewhere in the state. In addition, superexclusive registration status for the Southeast Alaska portion of Statistical Area A was implemented prior to the 1985/86 season. This change effectively limited vessel participation by precluding entry of vessels registered for Southeast Alaska into any other Tanner fishery in the State. Further restrictions to participation occurred prior to the 1985/86 season when a moratorium on issuance of new Tanner and king crab permits for Southeast Alaska was initiated. The interim permits issued under the moratorium are to be superceded by limited entry permits. A maximum transferable effort level of 83 Tanner vessels will most likely be permitted. These measures have succeeded in stabilizing the effort in these fisheries but at levels about sixty percent higher than that prior to the 1981/82 season (Table 1).

In 1986, the Board of Fisheries adopted a regulation to restrict the boundaries of Statistical Area A to those waters of the state between Dixon Entrance and Cape Fairweather and to establish a new designation

of Statistical Area D for those waters of the state between Cape Fairweather and Cape Suckling. Major restructuring of the administrative code delayed implementation of this Board action until early in 1987.

A significant processing problem first identified during the 1984/85 season, the bitter crab syndrome caused by the dinoflagellate *Hematodinium* sp. persisted in crab from upper Lynn Canal. Special surveys have been conducted by the Department on some of the fishing grounds in the Sullivan Island area of Lynn Canal on at least an annual basis since the summer of 1986. Nearly every survey has detected infection rates in very high percentages of all segments of the Tanner crab population in this general area.

Both the Yakutat and Southeast fisheries have shown a greater dependency on recruit crab in recent years. This is evident in the small average sizes and the nearly total lack post recruit crab in sampled landings. Greater variations in annual harvest levels can be expected to occur in a recruit fishery than in a mixed age class fishery. In a recruit fishery, survival of a single year class determines whether a commercially harvestable surplus is available to the fishery each season. When there is essentially no carry over of a portion of the recruitment into following seasons (Table 6), failure of a recruit class could result in curtailment of the fishery.

SEASON SUMMARY

The 1987/88 season in Southeast Alaska lasted from January 15, 1988 to February 16, 1988. Other than the very atypical 1982/83 season that lasted two weeks, this was the shortest season on record. The short opening reflects a trend toward shorter fishing periods in recent seasons and is an indication of the increasing effectiveness of both the participants and their gear. The Yakutat fishing area opened on January 15 and closed on May 1, 1988. Ex-vessel prices for both fishing areas opened at \$2.20 per pound and rose to as high as \$2.45 by the closure. At an average \$2.32 per pound the Southeast Alaska fishery was worth slightly more than \$3.0 million to the fishermen. In Yakutat, prices remained more static, eventually averaging \$2.17 per pound.

The average shell width of the 9,794 crab sampled from the Southeast Alaska fishery was 150.9 mm. This size indicates a fishery which targets very strongly on recruit size crab, since 50% of the crab were smaller than 150.9 millimeters. Five hundred forty eight crabs measured in Yakutat averaged 145.4 mm in shell width (Table 6).

Yakutat Fishery

Since three or fewer vessels have reported landings of Tanner crab from Statistical Area D, this data is confidential and can not be reported. The preseason harvest ceiling of 100,000 pounds was not exceeded this season. Port sampling of the crab indicated that they

were generally smaller and of lower quality than those caught in Southeast during the same season. The lower average price for these crab reflects these conclusions to some extent. As some of the fishing was done in areas historically known to have been very productive, catches during the past season suggest that the Tanner crab stocks in Yakutat are not recovering and remain at very low levels of abundance. This represents the second season in Yakutat where larger, seaworthy vessels, have fished once-productive grounds and experienced disappointing catches.

Southeast Alaska Fishery

One hundred thirteen vessels registered for the 1987/88 Statistical Area A Tanner crab fishery. Of these, eight were registered as tenders and fifteen for use of ring nets only. The remaining vessels registered for some combination of Tanner and the two species of king crab for which there was a fishery. Eighty-four permit holders reported landing at least some Tanner crab. As in the past several seasons, some vessels registered for combinations of king and Tanner crab but fished for only one species or predominantly one species.

The number of vessels registered as tenders has increased with each of the past three seasons. This indicates intensified fishing effort by pot fishermen and increasing competition for the available crab by processors. Increasing effort shortens the fishery, which in turn leads to further increases in effort.

The number of vessels registered for ring net fishing has also increased. This probably reflects a desire by new fishermen to enter a fishery otherwise closed to them by the moratorium on issuance of new permits for pot gear. Combinations of various permits for ring and pot gear are currently allowed and some imaginative arrangements for deployment of both types of gear have evolved. It is possible, for example, to fish ring net gear for king crab while holding a permit which allows pot fishing only for Tanner crab. The implications are obvious. As long as ring net fishing remains economically viable and open to entry, the number of ring net fishermen will probably increase.

The harvest for Southeast Alaska was managed for a total catch between 1.0 and 1.5 million pounds. The midpoint of the range (1.25 million pounds) was projected as the appropriate point harvest level based on available survey information, historical catch figures, and recent fleet performance indicators. A total of 1.29 million pounds of live crab were landed and processed. Of this, 12,450 pounds were landed by vessels registered to fish only ring nets.

As in the past several seasons, landings from Districts 10, 11, and 14 comprised the major part of the total landings. While District 11 retained its relative importance, District 10 contributions to the total catch rose during the 1987/88 season to closely approximate that of District 14 (Table 4). It is possible that the intensive brown king crab fishery in Frederick Sound created conditions conducive to increased Tanner crab landings from District 10.

The fishery was notable for the bad weather that accompanied the opening. Although fully half the opening was hampered by at least

localized drainage winds and freezing spray, the newly molted and old shell condition of many of the crabs sampled at the close of the fishery indicated that the upper District 11 stocks had probably been quite heavily exploited regardless of the weather. The relatively high landings from District 10 were also an indirect indication that the fishery there was not overly restricted by inclement weather.

Reported deadloss from a variety of causes totalled about 16,000 pounds. As in the past two seasons, a high, though unquantified portion of the deadloss was attributable to sorting and discarding of crab infected by the dinoflagellate (*Hematodinium* sp.). The reported deadloss was probably a very conservative estimate. Although a few processors and tenders were very conscientious about weighing and reporting deadloss, no one profits from unmarketable or dead crab so some processors simply discarded deadloss without reporting it.

Hematodinium sp. is the causative agent of the bitter crab syndrome. Fortunately, the parasite continues to only occur in significant numbers of crab in upper Lynn Canal and in lesser numbers in other areas. An elevated incidence of this infection has persisted for the past four seasons in the upper Lynn Canal fishing grounds. These grounds, which were closed last year, were reopened this season when a Department survey conducted in October 1987 suggested that the percentage of crab with clinical signs of the infection was declining. The actual catch from this area during the late winter season appeared to belie this conclusion. There will probably continue to be some concern about fishing this area during the next season.

Serological samples were collected from Pybus Bay, Deadmans Reach, Excursion Inlet, Barlow Cove and Eagle River during the summer and autumn red king crab surveys in 1988. The summer samples, which have been examined, suggest that in some areas, either the incidence of the infection is rising or the causative organism is spreading. Greater numbers of infected crab are being reported from areas where there were either no prior documented cases, or only a few isolated cases in the past. Samples taken in the autumn survey have yet to be examined.

There continue to be both confirmed and unconfirmed reports from the industry of low levels of the infection in other segments of the District 11 stock. Most notably, crab harvested from the Youngs Bay and Taku Harbor areas, as well as isolated bays in lower Stephens Passage, in District 10, seem to exhibit low infection rates. The level of infection in crab harvested from these areas appears to have remained fairly constant over the past few seasons.

The 1987/88 season was notable because more new processors entered the field and competed for the available harvest. The increase in numbers and activity of tenders was most evident in the northern districts. Field sampling was deterred more this season by the mobility and remoteness of some new processors and tenders than in the past. Some new processors had no experience with sorting infected crab and there was some concern early in the season that some bitter crab was being inadvertently processed.

ISSUES

The bitter taste syndrome, caused by infection with the dinoflagellate *Hematodinium* sp., will demand more study. The possible consequences of its spreading to uninfected stocks and its interactions with commercial harvest will need to be considered in Tanner crab management. The potential for spreading this disease by transport, handling, and possible discarding of diseased crab is unknown. Spread of the disease could affect the continued viability of a commercial fishery.

This occurrence of *Hematodinium* sp. is an opportunity to formulate a policy to deal with future outbreaks of infection in commercial shellfish. Such a policy should outline the procedures and practices that will be considered when such infections are identified. These could include sampling procedures, area closures, transport and processing restrictions, and differential harvest practices.

Vessel operators were allowed to store their gear in the water this season prior to the fishery in areas designated by the Fish and Wildlife Protection Division of the Department of Public Safety. The somewhat controversial program apparently operated without serious problems in its second year.

Barring exceptionally good or poor recruitment, the Southeast Alaska seasonal harvest should fluctuate between about 750,000 and one million pounds in the near future. It will continue to depend heavily on recruit-sized crab. The seasonal harvest for Yakutat shows very little hope for improvement and will probably remain at very low

levels, capable of supporting only a very small local fishery until a year class experiences exceptional early survival and recruits strongly into the fishery.

OUTLOOK

Analysis of the catch and catch patterns of the 1987/88 season suggests that an appropriate level of harvest for Tanner crab in Southeast Alaska (Statistical Area A), may be in the vicinity of one million pounds in the 1988/89 season. Any significant departure from this level will depend on fleet performance during the early segment of the season.

Any prospects for improvement in the Yakutat crab stocks depends on the survival and recruitment of one or more strong year classes into the fishery. There is little reason for optimism that the Tanner stocks in Statistical Area D will rebound strongly in the near future.

Table 1. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) Tanner crab commercial catches, 1961 to present.

Year/ Season	Southeast					Yakutat					Total Statistical Area A + D	
	Catch In Pounds	Number of Vessels	Pounds per Vessel	Number of Landings	Pounds per Landing	Catch In Pounds	Number of Vessels	Pounds per Vessel	Number of Landings	Pounds per Landing	Catch In Pounds	Number Vessels
1961	6,800	-				-	-				6,800	-
1962	7,820	-				-	-				7,820	-
1963		-				-	-				0	0
1964	13,940	-				-	-				13,940	-
1965		-				-	-				0	0
1966		-				-	-				0	0
1967	2,733	-				-	-				2,733	-
1968	109,220	-				-	-				109,220	-
1968/69	176,277	-		76	2,319	-	-				176,277	-
1969/70	660,337	-		347	1,903	-	-				660,337	-
1970/71	167,378	-		72	2,325	-	-				167,378	-
1971/72	656,661	-		274	2,397	-	-				656,661	-
1972/73	1,600,748	-		354	4,522	222,441	*		*		1,823,189	-
1973/74	1,309,673	-		419	3,126	1,872,357	-		110	17,021	3,182,030	-
1974/75	863,751	29	29,785	244	3,540	1,972,752	13	151,750	60	32,879	2,836,503	42
1975/76	2,149,397	31	69,335	369	5,825	1,762,589	5	352,518	35	50,360	3,911,986	36
1976/77	2,538,950	57	44,543	379	6,699	966,650	7	138,093	15	64,443	3,505,600	64
1977/78	2,138,088	44	48,593	337	6,344	1,003,116	8	125,390	103	9,739	3,141,204	52
1978/79	1,559,769	38	41,047	313	4,983	1,691,941	15	112,796	107	15,813	3,251,710	53
1979/80	1,781,923	53	33,621	355	5,020	2,427,860	23	105,559	114	21,297	4,209,783	76
1980/81	2,010,832	58	34,670	418	4,811	638,063	14	45,576	84	7,596	2,648,895	72
1981/82	3,306,990	74	44,689	443	7,465	71,302	7	10,186	32	2,228	3,378,292	81
1982/83	1,208,042	97	12,454	181	6,674	150,684	10	15,068	55	2,740	1,358,726	107
1983/84	1,629,076	104	15,664	338	4,820	11,142	4	2,786	13	857	1,640,218	108
1984/85	1,125,903	85	13,246	269	4,186	3,665	5	733	15	244	1,129,568	90
1985/86	997,306	84	11,873	320	3,117	2,379	4	595	9	264	999,685	88
1986/87	1,159,685	73	15,886	271	4,279	*	*	*	*	*	1,159,685	73
1987/88 ¹	1,296,815	85	15,257	366	3,543	*	*	*	*	*	1,296,815	85
1988/89	Season will open February 15, 1989.					Season will open January 15, 1989.						

¹ Most recent year's data should be considered preliminary.

* Where numbers of vessels participating is three or less, information is confidential. NOTE: Totals do not include confidential data.

Table 2. Statistical Area D (Yakutat) Tanner crab, harvest in thousands of pounds by district and season, 1968 to present.

Season	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr
1968	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1969	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1970	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1971	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1972	0.0	*	*	0.0	0.0	0.0	0.0	*
1973/74	0.0	0.0	0.0	0.0	2.6	7.7	313.8	990.2
1974/75	0.0	0.0	0.0	0.0	27.0	32.3	592.1	839.4
1975/76	0.0	0.0	0.0	48.4	184.6	276.7	661.8	456.7
1976/77	0.0	0.0	0.0	0.0	2.1	343.2	486.1	135.3
1977/78	0.0	3.0	14.5	31.6	161.7	206.0	254.2	279.0
1978/79	2.1	0.2	0.0	23.8	63.7	185.1	412.8	766.3
1979/80	0.0	10.2	16.4	27.9	56.9	522.2	1,218.6	575.6
1980/81	0.0	0.0	0.0	1.0	6.2	181.9	389.6	59.5
1981/82	Closed	Closed	Closed	Closed	0.0	0.0	16.4	47.1
1982/83	Closed	Closed	Closed	Closed	Closed	50.2	73.5	27.0
1983/84	Closed	Closed	Closed	Closed	Closed	1.7	5.8	3.6
1984/85	Closed	Closed	Closed	Closed	0.0	0.0	0.0	3.7
1985/86	Closed	Closed	Closed	Closed	0.3	0.6	1.1	0.4
1986/87	Closed	Closed	Closed	Closed	0.0	*	*	*
1987/88 ¹	Closed	Closed	Closed	Closed	0.0	*	*	*
1988/89	Season will open February 15, 1989.							

¹ Most recent year's data should be considered preliminary.

* Where number of vessels participating is three or less, information is confidential.

Table 3. Statistical Area D (Yakutat) Tanner crab, harvest in thousands of pounds by district and season, 1968/69 to present.

Season	District					Total
	181	183	184	186	191	
1968/69	0.0	0.0	0.0	0.0	0.0	0.0
1969/70	0.0	0.0	0.0	0.0	0.0	0.0
1970/71	0.0	0.0	0.0	0.0	0.0	0.0
1971/72	0.0	0.0	0.0	0.0	0.0	0.0
1972/73	2.9	102.2	12.8	104.6	0.0	222.5
1973/74	619.4	518.6	215.6	518.3	0.0	1,871.9
1974/75	1,135.1	193.7	118.7	97.2	428.0	1,972.7
1975/76	159.8	245.0	464.6	753.1	140.0	1,762.5
1976/77	0.0	452.7	167.8	346.2	0.0	966.7
1977/78	0.0	1,003.1	0.0	0.0	0.0	1,003.1
1978/79	0.0	350.9	589.2	207.9	544.0	1,692.0
1979/80	718.7	216.0	198.3	456.7	838.2	2,427.9
1980/81	20.3	156.1	122.8	78.1	260.7	638.0
1981/82	0.0	51.2	0.0	0.0	20.1	71.3
1982/83	60.7	83.3	1.6	0.5	4.5	150.6
1983/84	0.0	11.1	0.0	0.0	0.0	11.1
1984/85	0.0	3.7	0.0	0.0	0.0	3.7
1985/86	0.0	2.4	0.0	0.0	0.0	2.4
1986/87	0.0	*	0.0	*	0.0	*
1987/88 ¹	0.0	*	0.0	0.0	*	*
1988/89	Season will open January 15, 1989.					

¹ Most recent year's data should be considered preliminary.

* Where number of vessels participating is three or less, information is confidential.

Table 4. Statistical Area A (Southeast Alaska) Tanner crab, harvest in thousands of pounds by district to present.

Season	District													1
	1	2	3	4	5	6	7	8	9	10	11	12	13	
1968/69	0.0	0.0	0.0	0.0	0.0	0.0	0.6	82.6	2.1	63.1	9.2	0.0	8.0	
1969/70	0.0	0.0	0.0	0.0	0.0	0.7	0.0	78.4	0.0	179.0	227.6	4.8	28.6	
1970/71	0.0	0.0	0.0	0.0	0.0	0.0	0.0	43.3	31.7	0.6	75.7	2.9	10.6	
1971/72	0.0	0.0	0.0	0.0	0.0	0.6	0.0	71.6	30.9	69.6	71.0	0.4	99.7	3
1972/73	0.0	0.0	0.0	0.0	0.0	37.5	0.0	69.2	37.3	55.0	436.9	23.3	58.3	5
1973/74	0.0	0.0	0.0	0.0	0.3	18.8	4.2	23.1	46.1	132.8	616.2	1.7	60.8	4
1974/75	3.5	0.0	0.0	0.0	0.0	0.9	10.6	22.0	40.0	67.3	211.2	3.6	100.7	3
1975/76	0.0	0.0	0.0	0.0	14.3	2.8	11.3	112.8	98.9	138.0	828.6	92.5	176.3	5
1976/77	0.0	0.0	0.2	0.0	71.8	115.3	0.0	104.0	62.6	217.5	694.4	52.7	91.2	1,0
1977/78	3.9	0.0	17.0	0.0	0.3	124.6	0.0	60.1	6.7	212.6	580.3	96.6	86.4	7
1978/79	2.1	0.0	0.0	0.0	1.5	21.8	0.0	19.3	0.0	303.5	425.6	3.6	55.0	6
1979/80	0.0	0.0	0.0	0.0	0.0	5.9	15.6	118.2	24.8	237.2	749.4	22.0	33.3	3
1980/81	3.9	0.0	0.0	12.5	8.2	20.3	37.5	229.1	49.0	282.2	422.2	83.5	53.9	6
1981/82	0.9	0.0	0.0	0.0	0.0	121.4	41.8	201.2	0.1	167.4	405.0	78.5	66.0	2,1
1982/83	0.5	0.0	0.0	0.0	3.1	45.2	0.0	0.0	6.4	171.3	108.0	26.3	0.4	8
1983/84	0.0	0.0	0.0	0.1	14.7	42.0	29.1	46.4	28.9	205.4	375.0	23.4	62.6	6
1984/85	0.3	0.0	0.0	0.0	0.9	7.8	14.3	40.6	37.8	136.7	368.3	66.9	45.4	2
1985/86	*	0.0	0.0	0.0	*	16.7	3.7	22.4	*	74.9	475.7	39.7	47.1	1
1986/87	0.0	0.0	0.0	0.0	*	31.5	0.0	40.2	32.7	81.0	562.6	34.6	44.2	2
1987/88 ¹	*	0.0	0.0	0.0	*	44.0	*	31.6	22.9	220.1	523.6	58.5	*	2
1988/89	Season will open on February 15, 1989.													

¹ Most recent year's data should be considered preliminary.

* Where number of vessels participating is three or less, information is confidential.

Table 5. Statistical Area A (Southeast Alaska) Tanner crab, harvest in thousands of pounds, by month and season, 1968/69 to present.

Season	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	
1968/69	0.0	0.0	0.0	0.0	10.0	6.7	13.1	60.4	35.0	34.2	
1969/70	24.4	30.6	17.5	18.7	19.7	97.2	214.4	149.6	21.1	27.1	3
1970/71	0.9	1.5	6.7	7.1	21.3	41.4	56.2	32.2	0.0	0.0	
1971/72	0.0	29.9	31.0	39.0	29.4	17.9	91.6	203.5	148.5	58.5	
1972/73	5.4	42.0	83.8	86.7	50.7	140.8	376.6	554.6	228.7	26.6	
1973/74	29.4	91.8	94.8	87.3	69.5	126.3	314.7	406.2	89.8	0.0	
1974/75	4.3	77.2	70.6	56.6	71.6	74.4	180.6	225.8	102.6		Season
1975/76	13.3	110.3	125.4	107.1	159.7	367.4	634.6	460.0	171.5		
1976/77	3.9	76.1	262.2	203.2	337.0	393.4	693.1	457.9	112.1		
1977/78	29.4	160.8	138.9	175.1	149.8	303.6	592.1	588.5			
1978/79	6.6	47.6	76.7	91.7	200.1	189.2	465.4	422.3	60.3		
1979/80	60.7	55.7	74.5	61.0	153.9	440.0	607.2	282.4	37.5		
1980/81	33.7	51.9	48.5	60.1	315.9	494.9	627.3	350.5	28.1		
1981/82	Season Closed			870.8	597.7	708.9	809.4	315.2			
1982/83				1,208.0							
1983/84						862.3	726.8				
1984/85						531.3	593.0				
1985/86						565.8	425.9	2.6	0.0		
1986/87					634.2	525.5					
1987/88 ¹					757.9	539.0					
1988/89	Season will open February 15, 1989.										

¹ Most recent year's data should be considered preliminary.

Table 6. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) Tanner crab, commercial dockside size frequency sampling summary by size class in percent of sample, 1968/69 season to present.

SOUTHEAST						
Season	139mm	140-166mm	167mm	Average Carapace Width	Number Samples	Sample Size
1968/69	7.3	59.8	32.9	160.2	8	632
1969/70	9.3	72.4	18.3	155.1	10	1,574
1970/71	12.1	71.0	16.9	153.2	1	100
1971/72	22.0	66.0	12.0	147.4	2	150
1972/73	20.3	64.9	14.7	151.4	3	429
1973/74	16.7	65.7	17.6	152.8	9	1,668
1974/75	6.2	67.7	26.1	157.9	5	514
1975/76	8.0	77.3	14.7	154.1	14	1,657
1976/77	4.3	80.1	14.8	154.4	28	3,868
1977/78	4.3	80.4	15.3	155.4	38	4,881
1978/79	3.5	82.9	13.6	154.7	29	3,277
1979/80	2.9	84.5	12.6	154.7	45	4,834
1980/81	4.3	87.5	8.1	150.9	43	4,089
1981/82	10.5	84.3	5.2	149.7	62	6,758
1982/83	4.4	87.9	7.7	151.3	58	5,918
1983/84	2.4	92.9	4.8	151.8	26	2,687
1984/85	5.5	77.1	17.4	155.3	26	2,726
1985/86	6.2	86.0	7.8	154.7	51	5,453
1986/87	5.3	86.5	8.2	154.8	61	6,834
1987/88	6.4	87.9	5.7	150.9	96	9,936
1988/89	Season will open February 15, 1989.					

YAKUTAT						
Season	139mm	140-166mm	167mm	Average Carapace Width	Number Samples	Sample Size
1973/74	42.6	56.8	0.5	144.8	6	1,480
1974/75	39.2	60.0	0.8	141.9	5	732
1975/76	45.2	52.3	2.5	140.8	12	1,083
1976/77	16.4	82.0	1.6	146.6	3	880
1977/78	20.1	78.7	0.3	145.1	9	2,275
1978/79	9.4	90.4	0.2	147.1	17	1,723
1979/80	10.3	88.7	1.0	147.5	23	2,396
1980/81	12.4	87.2	0.4	147.4	23	2,604
1983/84	No samples taken					
1984/85	No samples taken					
1985/86	No samples taken					
1986/87	15.7	84.3	0.0	146.6	3	396
1987/88	3.6	96.4	0.0	145.3	2	444
1988/89	Season will open January 15, 1989.					

REPORT TO THE BOARD OF FISHERIES
SOUTHEAST ALASKA (STATISTICAL AREA A)

AND

YAKUTAT (STATISTICAL AREA D)

DUNGENESS CRAB

1988/1989

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Alaska Department of Fish and Game
Division of Commercial Fisheries

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BACKGROUND

Dungeness crabs (*Cancer magister*), are members of the highly evolved brachyuran (true crab) subgroup of the order Crustacea. They are a highly prized, commercially significant species found in coastal waters from Baja California to the Aleutian Islands. In terms of miles of coastline, about half the geographic range is in Alaska. They occur in commercially harvestable densities from San Francisco Bay to Kodiak Island, with nearly half of the United States harvest being taken in Alaskan waters in some years.

Historically, demand for Southeast Alaskan Dungeness crab has been inversely related to the availability of crab from Washington, Oregon, and California. Low catches to the south prompted greater efforts in Southeast Alaska to fill the demand for product. Conversely, as long as cheaper crab were available, Alaskan crab was not competitive. As a result, during the late sixties and seventies, a period of high catches to the south, Alaskan Dungeness crab stocks were not fully exploited.

The earlier Dungeness crab fishery in Southeast Alaska and other fishing areas of the State were nearly self-regulating. Numbers of fishermen were low and informal possession of personal fishing grounds was tacitly recognized. Enough unfished grounds existed so an operator encountering soft-shelled crabs or experiencing low catches in one area could easily move to alternative fishing areas. While demand remained low, restrictions to the fishery were largely unnecessary.

This pattern of fishing has undergone drastic change. In the early eighties, the apparent decline of the Dungeness fisheries of other Pacific Coast states increased demand for the Alaskan product. Concurrently, gradual changes in the marketing practices for Dungeness crab were occurring which also resulted in increased demand. The earlier practices of canning or freezing a meat pack were giving way to frozen sections and whole crab or transport of live crab to southern markets. Processors were more inclined to handle Dungeness crab, providing a market and support facilities for operators of Dungeness vessels. Local availability of processing and shipping services, existence of a summer fishing season to supply the high priced frozen-in-shell and live crab tourist-season markets in more southern ports, ease of entry into the fishery, and availability of crabs have all resulted in a more intense, competitive fishery. Informal arrangements and agreements for allocation of fishing grounds have eroded or vanished. All available fishing grounds and even marginal grounds are fully utilized by a fleet whose options no longer include relocation from areas of soft-shell crabs, mating crabs, or low catches to more suitable areas. The absence of self-management options has necessitated increased State involvement to control resource use and provide for continued harvest.

There is concern and controversy about the level of harvest which Southeast Alaskan and Yakutat Dungeness stocks can tolerate. The role of commercial harvest in the observed variability in stock abundance is now under discussion. That is, how much of the variability in the numbers of crab in a stock is due to fishing pressure and how much is due to natural factors? This is a question of some interest to both harvesters and managers because Alaska is the upper latitudinal limit of the range of the species and the factors which govern abundance can

be expected to have more accentuated effects here than in more favorable parts of its range. Of particular concern is the severity and longevity of depressions in stock conditions. There is little experience of truly depressed conditions in these stocks with which to gauge the effectiveness of current management practices. However, the Yakutat stock will provide some insight in the next few years because it has now cycled through a period of low abundance following a period of high abundance characterized by one or two extremely strong year classes. The stock now appears to be rebuilding.

The Dungeness crab fisheries in Southeast Alaska and Yakutat, two distinctly different fishing areas, are managed separately by the same management staff. Statistical Area A includes the inner and outer waters of Southeast Alaska's Alexander Archipelago from Dixon Entrance to Cape Fairweather. Statistical Area D includes coastal and estuarine waters between Cape Fairweather and Cape Suckling. It is commonly referred to as the Yakutat fishery.

Southeast Alaska Dungeness Crab

Dungeness crab are harvested in Districts 1 through 16 in bay areas with mud or sand bottoms, generally at depths less than 15 fathoms. Since 1960, the harvests have averaged about 1.73 million pounds when annual (1960 to 1968) and seasonal (1969/70 to present) data are combined. Between the 1970/71 and 1980/81 seasons the catches averaged 0.60 million pounds. Since the 1981/82 season, catches have been at relatively high levels and have averaged 2.72 million pounds (Table 1). The most significant proportion of seasonal harvests have

occurred from June through September (Table 3). Recent Board of Fisheries action has split the old season into June to August and October to February segments. The major harvests will probably be confined to the summer segment in the future, much as they have been concentrated during the summer months in the past. It is likely that effort will intensify in the summer to compensate for the shorter season. Winter fisheries are forced to contend with icing of bay fishing areas and inclement weather. A recent trend toward higher effort levels through the end of December has been accentuated by mild winters, strong markets, and the willingness of shorebased processors to handle crab late into the winter. Table 2a summarizes the 1988/89 season by month and district to date. The high summer catch and lower winter season catch is very characteristic and may represent a behavioral change in the crab between late summer and early winter.

From the early 1930's through 1955, regulations included a prohibition on the taking of females, a minimum size limit for males, and a closed season on the most important grounds for two to four months between May 1 and September 1. Available documentation from that period indicates that the prevailing idea was that molting occurred during the summer. Research to specifically determine molting periods has yet to be conducted. However, a limited amount of tagging work done in the early to mid-sixties suggested that the major molting period for male crab lasted from late winter through mid-summer. The same study suggested that females molt and mate through the summer months and carry eggs from September through March. The summer closure was generally acceptable to the fishermen because other fishing opportunities such as salmon and halibut fisheries prevailed during the summer. The summer closure was revoked during the mid 1950's. Until 1969 a prohibition on the taking of females, a minimum

legal size for males, and a liberal limit on the units of gear were the only regulations governing the fishery.

Since the late 1960's, fishing season closures have been introduced, then modified to reduce fishing pressure during sensitive periods in the life history of the species. For example, prior to the 1976/77 season, a closure from March through May was established. The closure was based on limited data which indicated that it was an important molting period, particularly for male Dungeness crabs.

In 1985, the latter half of August and the entire month of September were removed by regulation from the traditional season. A closure was instituted for this period because qualitative information suggests that it is the major mating period. This action was a further step in the gradual reduction of fishing time during periods that are believed to be sensitive life history periods.

Considerable variability is evident in both the molting and mating periods of this species in Southeast Alaska. While the current closed seasons allow some protection during these periods, significant portions of both periods overlap the current open season. The observed area and interseasonal variability may be caused in part by local variations in such factors as food availability and water temperature. The major concerns with fishing during sensitive life history periods are the mortalities associated with sorting soft-shelled crab during molting periods, the retention of light weight crab which have not totally regained prime condition, and the possible effects of disruption of mating activities on subsequent stock reproduction. Effects of handling on subsequent recruitment are not currently quantifiable for Southeast Alaska stocks but are known

to be significant in more southerly regions. It is reasonable to assume that the effects of handling are accentuated in Southeast Alaska which is northern periphery of the range of Dungeness crab.

The vessels in this fishery vary greatly in size and condition. The protected waters of the generally inshore fishery and the availability of numerous marketing opportunities and options allow a great variability in the condition and seaworthiness of vessels engaged in the fishery. Vessels generally range in size between small, outboard-powered skiffs and a few large Bering Sea-class crabbing vessels. However, most are below limit seiner (58 feet) lengths. The present 300 pot limit, discontinuous nature of crab habitat, and convenient support infrastructure in Southeast Alaska favor smaller vessels with lower operating expenses more than those typically fishing this species in the Pacific Northwest and the open water of the eastern Gulf of Alaska.

Yakutat Dungeness Crab

The average historic catch from the 1960 season through the present approximates 1.48 million pounds (Table 5). Historically, the largest proportion of the catch has been taken during the months of June and July even during those years when the fishery opened earlier and lasted longer than it currently does (Table 7).

The Dungeness fishery in the Yakutat area occurs primarily in the surf zone along the miles of productive sand and gravel beaches of the exposed outer coastline. The spits and channels that form at the

mouths of rivers cutting through these beaches also provide good habitat for dungeness crab. Fishing occurs at depths between four and fifteen fathoms. With some seasonal exceptions, fishing along the beaches both east and west of Icy Bay has generally been productive (Table 8).

Environmental conditions along the outer coast appear to be more uniform than along the convoluted shorelines of Southeast Alaska. Based on sampling information that indicated that molting follows a somewhat regular pattern, the Board approved a proposal for the current May 15 to August 15 summer season. However, molting does not consistently occur during the same period each year and the relative numbers of males molting during the period varies from year to year. It is possible that molt timing and proportion of the stock affected by molting are related to the size and structure of the population and availability of food. Lower numbers of crabs may result in less competition for food and higher growth rates, which in turn result in more frequent, less predictable molting patterns.

The general class of vessels actively engaged in this fishery range in size from 40 to 60 feet. A few skiffs and larger vessels also usually enter the fishery each season. As a rule, the fleet is composed of sturdy vessels in good operating condition designed to be operated in near-shore rollers and capable of open ocean transit. The 600 pot limit, open ocean conditions encountered, and remote nature of the fishing grounds favor larger vessels typical of Dungeness fisheries in the Pacific Northwest. In fact, most of the vessels fishing the more remote western and eastern grounds have home ports in the Pacific Northwest.

During those seasons which are predicted by the industry as likely to be especially productive, the fleet is often accompanied on the fishing grounds by tenders for the more distant processors. Occasionally, floating processors have been situated in Icy Bay to expedite handling and processing of crab.

SEASON SUMMARY

Southeast Alaska Fishing Area

The 1988/89 fishery is divided by regulation into two segments. The first lasted from June 15, 1988 through August 15, 1988. The second started on October 1, 1988 and will end on February 28, 1989. Two hundred seventy-two vessels registered to enter the fishery this past season, compared to 239 that registered in 1987/88. Approximately 3.0 million pounds have been landed to date. It is very likely that the season total will be in excess of 3.15 million pounds. With an average value of about \$0.91 per pound, the total season catch will be worth about \$2.87 million to the fishermen (ex-vessel price).

Districts 6, 8, 14, and 16, with reported landings of 734,000, 664,000, 460,000, and 347,000 respectively, accounted for about three-quarters of the total catch (Table 4). Within these major districts, four subdistricts, 10643 (Duncan Canal), 10840 (Stikine River mouth), 11470 (Glacier Bay), and 11641 (Cape Fairweather), produced half the

total regional catch. This same basic trend has persisted, with increasing intensity of effort in fewer areas, over the past few seasons.

Thus far, seventy-four percent (2.21 million pounds) of the total catch was taken during the summer season. The winter season catch thus far is 0.23 million pounds (Table 2b). The winter catch, even as projected for about 0.3 million pounds, is significantly lower than the last winter season (Table 2a). Catches for the Statistical Area A fishery summer season exhibited fairly stable catch rates throughout the season.

The reported incidence of soft-shell crab from some areas was high enough to be of concern. The incidence of soft-shell in some historically productive areas, notably around the Stikine River flats in District 8 and areas around Pleasant Island in District 14, immediately after the season opens does indicate that a June 15 opening may be too early in some areas during some years.

Dockside sampling of Dungeness crab was at one of the highest levels in recent history, with 76 individual landings sampled. The average shoulder width of the 6,309 crab measured was 181.8 mm (7.1 inches). The average width of sampled crab has remained fairly constant during the past four seasons (Table 9). One of the implications is that the stocks being harvested are composed of the crabs which have just molted to legal size and entered the fishery. It is very suggestive that the Dungeness fishery is a recruit fishery.

Aerial surveys, conducted both specifically for that purpose and as adjuncts to other survey flights, indicated very high effort in some

areas while others which appear to be suitable Dungeness habitat were lightly fished. This was probably the first summer for which any significant aerial survey information was collected. As such, it will become part of a historic data base from which seasonal comparisons of fishing patterns and effort will be made. Future survey efforts will concentrate on those areas from which major landings originate.

A Game Division sponsored survey of Dungeness crab populations in areas inhabited or likely to be colonized by sea otters was conducted in June. The F/V Adeline, a commercially rigged Dungeness crab vessel, was contracted to conduct the survey. Preliminary indications are that otters do affect at least Dungeness crab populations. One experimental area that was chosen because sea otters colonized it within the past five years was Port Althorp. Out of fifty pots set in Port Althorp, an area which has historically had viable Dungeness crab stocks, not a single Dungeness crab of any size or sex was caught. Future investigations should include other commercial crab species, such as Tanner and red king crab, which are vulnerable to sea otter predation during some stages in their life cycles.

It has also been reported by personnel from the Alaska Department of Fish and Game, Game Division, that sea otters are colonizing outer Sumner Straits, with the vanguard now entering Keku Straits. The continuing commercial availability of many species of shellfish will depend on what types of management and control programs are instituted for sea otters.

Yakutat Area Fisheries

As in the Southeast Alaska fisheries, the 1988/89 fishery was divided into two segments. In the Yakutat fisheries, the summer segment extended from May 15 to July 15, 1988 and the winter segment opened on November 1, 1988 and will close on February 28, 1989. Vessels registered into this fishery numbered 35, five more than in 1987/88.

Approximately 3.4 million pounds were landed. With an average value of \$1.04 per pound, this catch was worth about \$3.54 million to the fishermen (exvessel price).

Fishing patterns on the Yakutat grounds vary from season to season. This season, the most productive grounds were off the Yakutat Forelands where 34% of the total catch was reported and the Cape Yakataga area from which an additional 32% of the summer catch was reported. Twenty-two percent of the total catch was taken between the Icy Bay spit and the Yahtse River area.

This summer season was characterized by fewer than the anticipated numbers of vessels entering the fishery. Apparently, a very strong year class of crab entering the Washington State fishery deterred many crabbers from making the long trip north to Yakutat. As a result, the fishermen who entered the fishery this season did quite well in the face of little competition. The summer weather was also quite temperate, with only one moderate storm striking the coast during the season. Consequently, the amount of gear lost was modest.

No on-board sampling of Dungeness crab was conducted during the summer segment of the 1988/89 season. In addition, port sampling was not as extensive as statistically desirable. There were no tenders or floating processors in Icy Bay on which to base a sampler for on-board sampling. No trips were made to observe catch composition and assess the fishery operating on the Icy Bay and Yakataga grounds. Deliveries to the shore-based plant in Yakutat were unpredictable. A total of 4,869 crab were sampled for width and shell condition. Crabs from most districts ranged in average size from 185 to 188 millimeters in shoulder width, with a Statistical Area D grand mean of 182.9 millimeters (7.2 inches) (Table 9). Average sizes were considerably more uniform this season than last, and slightly higher than they have been for the past few seasons. This increase may represent the progression of a year-class of moderate strength through the fishery.

ISSUES

The Dungeness fisheries in Southeast Alaska (Statistical Area A) and Yakutat (Statistical Area D) can be considered fully developed and capitalized from the perspective of fishing effort. Dungeness crab processors, or intermediate marketing concerns are also present and well established. It is likely, under current stock and price conditions that effort levels will continue to increase, as has been the norm in Southeast Alaska during the past 8 seasons. In Yakutat, available fishing effort is sufficient to continue harvesting those stocks at a high rate. More than ever before, the Dungeness crab

industry in Region 1 can be expected to operate independently of occurrences in the Dungeness crab fisheries in other Pacific Coast locations.

Present fishing and processing effort levels can only be satisfied by a continued abundance of Dungeness crab. All grounds are known and exploited during the fishing season, conflicts between fishermen on the grounds are increasing, and reports of handling of crab unacceptable to market are increasing. It is likely that any significant decrease in the availability of Dungeness crab will negatively impact a portion of the fleet and the processing sector.

While fishing and processing effort will be available at relatively high levels, future abundances of Dungeness crab are not known. Information currently available to the fishery manager is confined to: harvest data resulting from fish ticket information, cursory examination of partial life history data gathered during the mid-1960's, a limited volume of dockside sampling of commercial landings from the fisheries, and a review of information from other Dungeness fisheries. Research projects necessary to gather scientific information necessary for proper management have not been established.

Management in Region I has been conducted under a modified version of the traditional size, sex, and season (3S) management which was developed and is utilized in other Pacific Coast locations. Pure 3S management philosophy maintains stock reproductive potential by: not harvesting male crab until they have had an opportunity to participate in stock reproduction (SIZE), by not harvesting females (SEX), and by not harvesting during the molting and mating periods (SEASON). In

theory, all male Dungeness crab above the minimum legal size can be taken in the fishery each season. Adherence to this management system has not guaranteed consistent moderate to high levels of abundance of dungeness crab. Numerous investigators have hypothesized why the availability of Dungeness crab has been unstable, but supportable answers are very limited. Intuitively, the biology of the Dungeness crab is much more complicated than scientists perceive, and the effects of major fisheries on stock dynamics are more significant than can be demonstrated.

The modification to the pure 3S management system utilized in Region 1 fisheries is an alteration of the fishing season. In our fisheries, we fish during significant portions of the molting and mating period. The effects of fishing during this period are quantitatively unknown. Qualitatively, we do know from limited sampling that significant handling occurs on the legal size crab that are unacceptable for market. These crab are unacceptable by virtue of lack of meat fullness. Quantitative research data in other Dungeness crab fisheries indicates that significant mortalities occur from these handling practices. During periods of heavy summer fishing, it appears that we remove a significant portion of the male stock through fishing mortality prior to the period when the females are molting and mating. We do utilize a closure during the perceived female molting and mating period. The ultimate effect this practice may have on future populations, if any, is not known. By fishing during the male molting period, we are fishing during the growth and recruitment period. In some years, this may result in fishing on two significant year classes during the same fishing season.

Possible solutions of the problems of high effort levels and resulting high harvest rates during sensitive life history periods are difficult to implement. A limited entry system was proposed by industry and subsequently rejected by CFEC. Reducing fishing periods during the molting and mating period was proposed. The end result was the present season compromise, under which the fleet has intensified fishing effort during the early summer months. The establishment of moderate guideline harvest ranges (GHR) has been discussed and rejected because this regulatory method is not a part of the traditional 3S management system for this species. However, considering that fishing during the molting and mating season will continue for a number of reasons, some other modification of the management program should occur to offset the season compromises. In addition, management on the fringes of the northern range of the species intuitively indicates that appropriate management should be conservative. More conservative management could be developed utilizing guideline harvest ranges to carry over recruitment, lessen the dependency on a recruit only fishery, and provide additional reproductive protection.

OUTLOOK

Region I remains without research and management programs specific to Dungeness crab. In addition to normal duties, such as fish ticket collection and compilation, priorities for the next season will be to continue the dockside sampling program in Yakutat, increase the dockside sampling program in Southeast Alaska, conduct overflights of

major fishing grounds in the fisheries, conduct on-board sampling when possible, and investigate the potential of gaining population abundance information through a test-fishing program on major fishing grounds. Analysis of data gathered by department personnel during the mid-1960's is being conducted by the headquarters research staff to better summarize the known information on Dungeness life history in Southeast Alaska.

Without adequate research and management programs it is difficult to predict future dungeness harvests. Qualitative information and limited quantitative information can be gleaned from field observations, skipper interviews, dockside sampling, on-board sampling and harvest statistics. Harvests from the fall fishery are considerably lower than those experienced during the past three seasons. This could be indicative of declining recruitment and availability of legal crab, the result of heavy fishing pressure during the summer fishery, or other factors. Available fishing effort was at least 10 times that experienced in 1980/81. Given heavy fishing pressure, it is possible that the 1989/90 harvest of Dungeness crab from Southeast Alaska will be considerably less, perhaps 50% less, than those harvests experienced during the past 8 seasons. Should this occur, in-season adjustments in management may be necessary to conserve the Dungeness crab resource.

Information from the Yakutat fishery suggests that the 1989/90 harvest in this area may be similar to the 1988/89 season. The average crab might be larger and heavier this coming season. These are estimates with considerable limitations considering the data sources, and should not be viewed as recommended guideline harvest levels or quotas.

Table 1. Statistical Area A (Southeast Alaska) Dungeness catch, number of participating vessels, number of landings, and average catch per landing, 1960 to present.

Year/Season	Catch in Pounds	Number of Vessels	Pounds per Vessel	Number of Landings	Pounds per Landing
1960	1,449,405	-			
1961	671,455	-			
1962	2,985,939	-			
1963	3,296,362	-			
1964	3,996,100	-			
1965	2,392,395	-			
1966	1,968,117	-			
1967	2,033,156	-			
1968	1,900,690	-			
1969/70	1,149,111	20	57,456	392	2,931
1970/71	776,617	21	36,982	380	2,044
1971/72	451,281	23	19,621	315	1,433
1972/73	597,587	30	19,920	315	1,897
1973/74	748,519	41	18,257	483	1,550
1974/75	713,668	43	16,597	453	1,575
1975/76	611,621	36	16,989	346	1,768
1976/77	515,378	25	20,615	174	2,962
1977/78	127,201	12	10,600	87	1,462
1978/79	749,683	25	29,987	207	3,622
1979/80	801,753	37	21,669	313	2,562
1980/81	512,247	26	19,702	226	2,267
1981/82	2,935,110	76	38,620	748	3,924
1982/83	3,646,882	128	28,491	1,306	2,792
1983/84	2,150,205	133	16,167	1,533	1,403
1984/85	1,833,250	179	10,242	1,564	1,172
1985/86	2,311,556	215	10,751	2,072	1,116
1986/87	2,454,434	222	11,056	2,327	1,055
1987/88	3,370,697	244	13,814	2,797	1,205
1988/89 ¹	3,023,317	260	11,628	2,180	1,387

¹ Most recent year's data should be considered preliminary.

Table 2a. Statistical Area A (Southeast Alaska) 1988/89 season; Dungeness crab harvest by month and district.

Dist.	1988								1989		Total
	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	
101	Closed	0	0	0	Closed	27,228	8,664	0	0	0	35,892
102	Closed	0	0	0	Closed	2,598	600	0	0	0	3,198
103	Closed	0	0	0	Closed	197	103	0	0	0	300
104	Closed	0	1,240	0	Closed	0	0	0	0	0	1,240
105	Closed	30,270	63,485	22,746	Closed	4,205	1,416	0	0	0	122,122
106	Closed	276,822	298,683	94,012	Closed	59,868	15,816	0	0	0	745,201
107	Closed	14,572	22,954	16,624	Closed	5,600	870	0	0	0	60,620
108	Closed	183,446	346,724	107,749	Closed	27,929	4,727	0	0	0	670,575
109	Closed	22,627	74,226	31,552	Closed	2,631	1,583	0	0	0	132,619
110	Closed	55,557	135,009	38,059	Closed	12,588	1,727	0	0	0	242,940
111	Closed	7,510	39,044	19,488	Closed	10,817	1,860	0	0	0	78,719
112	Closed	2,149	31,962	14,233	Closed	0	6,694	0	0	0	55,038
113	Closed	8,930	24,820	7,772	Closed	1,712	2,066	0	0	0	45,300
114	Closed	93,902	221,311	105,054	Closed	33,875	6,212	0	0	0	460,354
115	Closed	3,016	4,510	802	Closed	722	294	0	0	0	9,344
116	Closed	75,490	133,105	114,381	Closed	13,221	23,658	0	0	0	359,855
Total		774,291	1,397,073	572,472		203,191	76,290	0	0	0	3,023,317

Table 2b. Statistical Area A (Southeast Alaska) 1987/88 season; Dungeness crab harvest by month and district.

Dist.	1987								1988		Total
	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	
101	Closed	0	0	0	Closed	22,483	20,901	8,399	2,119	3,841	57,743
102	Closed	0	0	0	Closed	5,350	500	0	0	0	5,850
103	Closed	0	2,831	1,082	Closed	426	5,831	980	543	1,572	13,265
104	Closed	0	0	1,788	Closed	0	0	0	0	0	1,788
105	Closed	22,655	61,590	19,589	Closed	21,898	15,950	7,991	4,337	7,830	161,840
106	Closed	103,499	146,844	59,926	Closed	125,084	43,240	15,037	8,823	5,816	508,269
107	Closed	14,919	21,319	6,529	Closed	9,046	10,604	7,244	3,521	6,385	79,567
108	Closed	114,873	177,089	103,011	Closed	66,815	40,733	20,089	6,874	5,055	534,539
109	Closed	75,017	124,347	51,997	Closed	23,430	13,801	5,526	1,731	4,352	300,201
110	Closed	72,936	161,924	81,795	Closed	38,816	14,905	1,897	1,632	3,217	377,122
111	Closed	7,430	48,485	34,280	Closed	23,395	2,790	0	570	1,605	118,555
112	Closed	23,443	77,843	32,464	Closed	11,039	1,893	1,230	0	1,314	149,226
113	Closed	10,343	40,827	12,770	Closed	7,687	3,042	2,006	0	0	76,675
114	Closed	72,153	209,882	136,256	Closed	90,120	28,875	6,219	3,075	7,455	554,035
115	Closed	15,611	5,807	1,502	Closed	6,854	757	104	175	119	30,929
116	Closed	38,053	107,152	96,673	Closed	24,089	70,810	28,699	29,654	5,963	401,093
Total		570,932	1,185,940	639,662		476,532	274,632	105,421	63,054	54,524	3,370,697

¹ Most recent year's data should be considered preliminary.

Table 3. Statistical Area A (Southeast Alaska) Dungeness crab catch in thousands of pounds by month and season, 1969/70 to present.

Season	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Total
1969/70	21.3	84.9	201.0	217.5	225.5	210.9	106.2	47.3	14.2	5.0	7.1	8.1	1,149.1
1970/71	11.1	37.0	168.5	150.4	157.1	122.6	68.6	35.9	9.3	5.6	4.6	5.9	776.6
1971/72	7.4	27.4	43.6	97.8	79.3	88.9	63.3	23.3	9.5	7.0	1.8	2.2	451.3
1972/73	4.2	30.5	38.6	167.2	167.7	83.6	49.5	31.5	16.7	3.5	1.4	3.2	597.6
1973/74	16.9	40.9	142.4	205.8	129.3	87.3	71.6	27.5	8.8	3.5	4.7	9.9	748.5
1974/75	24.8	21.5	135.5	167.1	135.0	85.0	53.9	27.6	26.5	6.3	13.7	16.8	713.7
1975/76	18.1	35.9	110.2	136.8	120.8	82.8	49.7	25.9	11.7	6.9	2.9	9.9	611.6
1976/77	Closed	Closed	105.9	206.1	89.9	46.1	32.0	13.2	11.7	4.1	6.1	Closed	515.4
1977/78	Closed	Closed	2.3	8.5	29.6	31.4	15.9	25.0	6.2	0.5	8.0	Closed	127.2
1978/79	Closed	Closed	126.4	206.9	152.6	104.6	70.3	43.3	18.2	18.2	9.1	Closed	749.7
1979/80	Closed	Closed	165.7	184.6	137.0	137.5	75.1	52.1	30.1	12.7	6.9	Closed	801.8
1980/81	Closed	Closed	62.7	157.1	122.2	69.9	36.3	30.2	15.1	8.6	10.1	Closed	512.2
1981/82	Closed	Closed	460.6	899.5	560.3	427.1	292.9	164.2	67.7	28.4	33.9	Closed	2,934.6
1982/83	Closed	Closed	936.7	1,047.5	735.3	450.1	219.7	145.9	68.2	16.3	22.9	Closed	3,642.5
1983/84	Closed	Closed	772.0	451.0	334.5	267.5	146.5	84.4	45.8	30.9	14.7	Closed	2,147.4
1984/85	Closed	Closed	0.0	670.8	494.4	272.4	154.4	138.2	58.6	27.0	15.1	Closed	1,833.3
1985/86	Closed	Closed	362.5	847.8	438.5	Closed	379.6	177.6	55.5	29.7	20.1	Closed	2,311.6
1986/87	Closed	Closed	270.1	795.9	446.3	Closed	460.7	274.5	100.3	58.1	48.7	Closed	2,454.4
1987/88	Closed	Closed	570.9	1,185.9	639.7	Closed	476.5	274.6	105.4	63.1	54.5	Closed	3,370.7
1988/89 ¹	Closed	Closed	774.3	1,397.1	572.5	Closed	203.2	76.3	0.0	0.0	0.0	Closed	3,023.3

¹ Most recent year's data should be considered preliminary.

Table 4. Statistical Area A (Southeast Alaska) Dungeness crab, harvest in thousands of pounds, by district and season 1969/70 to the present.

SEASON	DISTRICT																TOTAL
	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	
1969/70	12.6	0.0	0.0	0.0	27.8	44.0	9.9	230.1	154.7	103.4	9.7	100.9	28.6	404.7	22.6	0.0	1,149.0
1970/71	16.7	0.0	0.0	1.9	8.1	33.2	5.8	92.5	183.7	72.7	0.0	77.2	12.0	178.4	13.2	81.4	776.8
1971/72	15.7	0.0	0.0	0.0	0.0	60.6	5.3	45.3	54.7	46.8	0.0	35.0	14.5	118.1	16.6	37.9	451.2
1972/73	11.4	0.0	0.0	0.0	8.1	30.8	11.8	40.3	41.9	36.9	0.0	49.8	14.6	106.0	31.7	214.5	597.8
1973/74	11.0	0.0	0.0	0.0	5.5	21.1	36.2	21.4	27.8	50.1	65.6	84.0	39.4	137.1	63.9	185.4	748.5
1974/75	28.5	0.0	0.0	0.0	20.5	96.4	86.9	41.6	16.2	47.9	46.1	62.7	11.6	147.3	41.9	65.9	713.5
1975/76	43.4	0.0	1.9	0.0	47.9	21.6	100.6	17.1	8.1	53.4	2.4	17.4	72.1	165.3	11.5	49.0	611.7
1976/77	20.2	0.0	5.5	0.1	14.4	15.2	19.7	8.2	0.2	49.2	8.2	41.3	29.7	138.1	1.3	163.9	515.2
1977/78	21.1	0.0	1.1	0.0	18.4	21.3	6.9	11.2	0.0	30.2	1.1	14.7	0.1	1.2	0.0	0.0	127.3
1978/79	36.9	0.0	0.0	0.0	73.4	110.9	28.8	32.8	17.1	93.8	2.3	10.3	57.5	195.3	1.4	89.3	749.8
1979/80	23.6	0.0	0.6	0.0	52.4	101.9	63.3	54.8	2.6	50.9	0.2	63.0	27.3	279.5	0.1	81.4	801.6
1980/81	28.5	0.0	2.2	0.0	73.2	166.4	0.0	19.8	25.9	48.6	0.6	61.2	7.0	76.9	2.0	0.0	512.3
1981/82	13.9	0.0	3.8	0.0	238.2	762.2	119.3	225.3	42.8	66.8	16.9	113.2	201.7	945.6	15.4	170.1	2,935.2
1982/83	53.0	2.4	15.7	0.0	294.2	467.2	165.1	790.2	20.7	144.1	39.8	356.5	227.8	523.2	9.0	537.9	3,646.8
1983/84	71.8	1.0	13.9	3.9	85.7	142.6	70.9	591.7	79.9	137.7	6.2	77.0	116.2	251.0	8.5	492.1	2,150.1
1984/85	111.8	11.2	11.3	0.2	131.7	399.6	99.8	265.4	171.6	47.8	21.4	137.5	112.3	197.6	26.4	87.5	1,833.1
1985/86	66.3	7.1	6.5	3.9	137.9	492.2	177.8	374.9	255.5	69.1	15.7	183.2	120.0	262.6	9.0	129.6	2,311.3
1986/87	53.8	0.4	11.0	1.0	98.1	351.9	83.5	352.4	257.9	315.6	27.4	174.3	99.7	471.1	36.1	120.1	2,454.3
1987/88	57.7	5.9	13.3	1.8	161.8	508.3	79.6	534.5	300.2	377.1	118.6	149.2	76.7	554.0	30.9	401.1	3,370.7
1988/89	35.9	3.2	0.3	1.2	122.1	745.2	60.6	670.6	132.6	242.9	78.7	55.1	45.3	460.4	9.3	359.9	3,023.3

Most recent year's data should be considered preliminary.

Table 5. Statistical Area D (Yakutat) Dungeness crab catch, number of participating vessels, number of landings, and average catch per landing, 1960 to present.

Year/Season	Catch in Pounds	Number of Vessels	Pounds per Vessel	Number of Landings	Pounds per Landing
1960	543,762	-			
1961	1,023,545	-			
1962	937,051	-			
1963	1,383,298	-			
1964	637,140	-			
1965	910,278	-			
1966	528,060	-			
1967	2,031,460	-			
1968	2,096,119	-			
1969/70	1,207,397	-		107	11,284
1970/71	1,508,561	-		83	18,175
1971/72	1,212,198	-		88	13,775
1972/73	1,992,574	-		85	23,442
1973/74	2,347,752	-		236	9,948
1974/75	1,031,573	-		154	6,699
1975/76	579,908	17	34,112	113	5,132
1976/77	529,470	7	75,639	28	18,910
1977/78	116,052	-		11	10,550
1978/79	1,799,403	12	149,950	122	14,749
1979/80	1,436,923	21	68,425	87	16,516
1980/81	883,633	11	80,330	63	14,026
1981/82	3,228,301	28	115,296	169	19,102
1982/83	5,158,111	35	147,375	305	16,912
1983/84	2,663,520	67	39,754	458	5,816
1984/85	773,356	39	19,830	227	3,407
1985/86	371,114	32	11,597	168	2,209
1986/87	757,257	22	34,421	112	6,761
1987/88	2,724,601	28	97,307	188	14,493
1988/89 ¹	3,450,472	32	107,827	210	16,431

¹ Most recent year's data should be considered preliminary.

Table 6. Statistical Area D (Yakutat) 1988/89 and 1987/88 seasons; Dungeness crab harvest by month and district.

District	1988								1989		Total
	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	
181	318,403	729,987	134,668				0	0	0	0	1,183,058
183	45,087	67,300	4,104				0	0	0	0	116,491
184	86,291	126,466	56,122		Season Closed		0	0	0	0	268,879
186	496,688	193,401	80,645				0	0	0	0	770,734
191	57,189	739,370	314,751				0	0	0	0	1,111,310
Total	1,003,658	1,856,524	590,290				0	0	0	0	3,450,472

District	1987								1988		Total
	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	
181	182,009	272,546	86,656				4,684	9,767	8,326	854	564,842
183	17,131	19,165	291				6,340	574	148	1,048	44,697
184	200,270	281,619	62,816		Season Closed		0	0	0	0	544,705
186	434,310	561,185	80,421				30,480	16,889	0	0	1,123,285
191	12,885	145,455	244,369				0	16,890	0	27,473	447,072
Total	846,605	1,279,970	474,553				41,504	44,120	8,474	29,375	2,724,601

¹ Most recent year's data should be considered preliminary.

Table 7. Statistical Area D (Yakutat) Dungeness crab catch. In thousands of pounds by month and season, 1969/1970 to present.

Season	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Total
1969/70	0.0	87.7	254.7	529.0	336.1	0.0	0.0	0.0	0.0	0.0	0.0	1,207.4
1970/71	0.0	40.3	386.6	426.1	511.9	143.6	0.0	0.0	0.0	0.0	0.0	1,508.6
1971/72	0.0	8.6	407.8	572.4	223.4	0.0	0.0	0.0	0.0	0.0	0.0	1,212.2
1972/73	0.0	100.7	653.7	842.1	392.7	3.4	0.0	0.0	0.0	0.0	0.0	1,992.6
1973/74	18.5	205.4	679.7	1,079.5	195.2	88.3	80.9	0.0	0.0	0.0	0.3	2,347.8
1974/75	16.3	141.0	476.0	213.3	113.3	37.4	34.3	0.0	0.0	0.0	0.0	1,031.6
1975/76	Closed	84.3	239.5	256.1	Closed	Closed	Closed	Closed	Closed	Closed	Closed	579.9
1976/77	Closed	Closed	132.2	234.3	163.0	0.0	0.0	0.0	0.0	0.0	0.0	529.5
1977/78	Closed	Closed	0.0	0.0	33.7	72.9	0.0	1.6	0.6	7.2	0.0	116.1
1978/79	Closed	Closed	738.1	816.3	245.0	Closed	Closed	Closed	Closed	Closed	Closed	1,799.4
1979/80	Closed	Closed	840.1	563.9	32.9	Closed	Closed	Closed	Closed	Closed	Closed	1,436.9
1980/81	Closed	Closed	404.4	318.3	139.6	18.7	0.5	0.0	0.0	0.5	1.5	883.6
1981/82	Closed	Closed	2,467.7	634.9	125.7	Closed	Closed	Closed	Closed	Closed	Closed	3,228.3
1982/83	Closed	0.0	3,090.9	1,856.6	210.7	0.0	0.0	0.0	0.0	0.0	0.0	5,158.1
1983/84	Closed	969.1	1,197.4	201.7	42.6	183.2	55.8	2.6	5.6	2.6	2.9	2,663.5
1984/85	Closed	402.8	316.5	54.1	Closed	Closed	Closed	0.0	0.0	0.0	0.0	773.4
1985/86	Closed	158.2	160.5	49.1	Closed	Closed	Closed	1.3	1.0	0.6	0.5	371.1
1986/87	Closed	195.2	395.3	123.0	Closed	Closed	Closed	24.8	16.6	1.3	1.0	757.3
1987/88	Closed	846.6	1,280.0	474.6	Closed	Closed	Closed	41.5	44.1	8.5	29.4	2,724.6
1988/89 ¹	Closed	1,003.7	1,856.5	590.3	Closed	Closed	Closed	0.0	0.0	0.0	0.0	3,450.5

¹ Most recent year's data should be considered preliminary.

Table 8. Statistical Area D (Yakutat) Dungeness crab harvest in thousands of pounds, by district and season, 1969/70 to present.

Season	District					Total
	181	183	184	186	191	
1969/70	0.0	481.3	18.9	442.5	264.7	1,207.4
1970/71	362.4	6.0	58.0	370.9	711.2	1,508.5
1971/72	405.3	133.7	276.1	355.5	41.6	1,212.2
1972/73	879.0	52.0	273.5	727.8	60.4	1,992.7
1973/74	950.8	108.0	306.5	652.8	329.7	2,347.8
1974/75	182.8	35.0	237.7	514.6	61.5	1,031.6
1975/76	166.8	28.3	81.7	283.2	19.9	579.9
1976/77	67.3	37.7	63.3	361.3	0.0	529.6
1977/78	0.0	9.4	0.0	106.6	0.0	116.0
1978/79	426.2	209.2	289.7	797.9	76.4	1,799.4
1979/80	201.2	108.6	218.3	599.2	309.7	1,437.0
1980/81	243.2	72.3	20.1	425.0	123.0	883.6
1981/82	829.3	237.3	681.7	994.0	485.9	3,228.2
1982/83	691.5	404.2	1,715.0	784.5	1,563.0	5,158.2
1983/84	774.8	333.5	499.6	714.5	341.2	2,663.6
1984/85	249.0	135.6	53.6	306.4	28.7	773.3
1985/86	138.5	78.8	17.9	112.2	23.7	371.1
1986/87	245.5	49.8	16.3	369.9	75.7	757.2
1987/88	564.8	44.7	544.7	1,123.3	447.1	2,724.6
1988/89 ¹	1,183.1	116.5	268.9	770.7	1,111.3	3,450.5

¹ Most recent year's data should be considered preliminary

Table 9. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) summary of commercial dockside samples of Dungeness crab, 1976/77 season to present.

Southeast Fishery	1976 1977	1977 1978 •	1978 1979	1979 1980	1980 1981	1981 1982	1982 1983	1983 1984	1984 1985	1985 1986	1986 1987	1987 1988	1988 1989 ¹
Nb. of samples	3	6	11	4	5	7	9	10	3	24	29	56	76
Nb. of crab measured	295	624	1,124	420	445	715	840	1,103	302	2,414	2,906	5,508	6,309
Average shoulder width, mm	177.7	178.7	180.0	181.2	180.6	184.0	187.0	186.5	175.9	175.2	180.2	177.8	181.8
Average shoulder width, inches	7.0	7.0	7.1	7.1	7.1	7.2	7.4	7.3	7.0	6.9	7.1	7.0	7.1
Range shoulder width, mm	159-204	159-211	161-213	160-217	161-207	165-215	164-218	159-225	164-205	157-228	156-228	160-213	157-219
Yakutat Fishery	1976 1977	1977 1978	1978 1979	1979 1980	1980 1981	1981 1982	1982 1983	1983 1984	1984 1985	1985 1986	1986 1987	1987 1988	1988 1989 ¹
Nb. of samples	3	2	27	3	2	10	16	31	41	61	30	27	40
Nb. of crab measured	327	188	4,491	437	494	1,077	1,700	2,473	3,593	6,729	2,224	4,080	4,869
Average shoulder width, mm	176.3	182.4	182.4	184.6	175.8	175.7	182.4	184.6	190.6	180.0	176.4	181.1	182.9
Average shoulder width, inches	6.9	7.2	7.1	7.4	7.1	6.9	7.2	7.6	7.5	7.1	7.1	7.1	7.2
Range shoulder width, mm	157-207	161-211	156-221	166-221	161-215	160-218	158-222	163-231	162-232	156-226	158-226	159-224	153-222

¹ Most recent year's data should be considered preliminary.

REPORT TO THE BOARD OF FISHERIES
SOUTHEAST ALASKA (STATISTICAL AREA A)

AND

YAKUTAT (STATISTICAL AREA D)

SHRIMP

1988/1989

By

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Southeast Region
Alaska Department of Fish and Game
Division of Commercial Fisheries

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BACKGROUND

Shrimp Beam Trawl Fishery

The beam trawl was the initial shrimp trawl fishing gear when harvesting and processing was initiated in District 10 (Thomas Bay) in 1915. Four additional processors were established by 1921. The fishery continued to expand in fleet size, production capabilities, and geographic fishing area well into the 1950's when Statistical Area A was a major producer in Alaska. The development of the Westward shrimp fisheries started to dominate Alaska shrimp production in 1959. The Southeast Alaska beam trawl fishery targets primarily on pink shrimp, (*Pandalus borealis*), with lesser quantities of sidestripe shrimp, (*Pandalopsis dispar*), coonstripe shrimp, (*Pandalus goniurus*), humpy shrimp, (*P. hypsinotus*), and spot prawns, (*P. platycerous*), being landed in the fishery.

From 1955 through 1967, annual beam trawl harvests ranged from 1.7 to 7.6 million pounds and averaged 3.6 million pounds. Number of participating vessels ranged from 10 to 22 during this period. The annual harvests prior to 1959 were heavily dependent upon production from District 10. Beam trawl harvests began to decline in the 1960's, and continued at lower effort and harvest levels through the 1970's.

Harvests since 1968/69 have ranged from 0.4 to 2.2 million pounds and averaged 1.2 million pounds. The number of participating vessels ranged from 8 to 23 during the past twenty seasons.

Prior to 1970, two geographic areas produced the major portion of the harvest. These were District 10 (Thomas Bay) and District 6 (Duncan Canal). District 10, which once supported the entire industry, has decreased in documented importance from producing 53 percent of the statistical area harvest in 1960 to less than 1 percent at the current time. Conversely, District 6 contributed 23 percent of the total harvest in 1960, and now contributes over 70 percent of the total harvest.

Production from Districts 8 and 7 have become increasingly important to the total harvest since 1960. Districts 6, 8, and 10 have traditionally produced good harvests from May through August. In past years with high production, small shrimp have been evident in the harvests.

During the early years of the fishery there were over 20 active processors. However, processing during this era was characterized by hand-peeling the harvests. The number of processing facilities has declined since peak harvests occurred in 1958. A reduction in processing capacity has not occurred. The large number of plants utilizing exclusively hand peeling was gradually replaced by relatively few plants utilizing mechanical peelers. During the late 1960's large harvests were maintained by facilities, with a total of 3 mechanical peeling machines, and some hand peeling of the larger shrimp species. At the current time, only one mechanical peeler is in operation.

Considering an average harvest of just over 1.18 million pounds since the 1969/70 season, an average of 10 percent sidestripe shrimp, and

current prices, this fishery is worth approximately \$450,000 to an average of 13 participating vessels.

Management has been restricted to the collection of fish ticket information, comparison of season harvests to published guideline harvest levels, very limited vessel skipper interviews, and limited samples of commercial landings to determine relative year-class strength. Regulations specify: that trawling can be conducted only by beam trawl gear in portions of Districts 6, 8, and 10; an open season from May 1 through February 15 in districts 6, 7, 8 and 10, unless the districts are closed earlier by emergency order based upon the GHR (Guideline Harvest Range); GHRs, reflective of recent historic harvests; and mesh restrictions designed to provide some escapement of smaller shrimp.

Shrimp Pot Fishery

The shrimp pot fishery targets on the larger spot prawn. Harvest records indicate that this fishery was at embryonic stages from 1962 to 1968. Until 1980, effort and harvest had been sporadic. Participation in this fishery had been as a supplemental income source for most vessels involved. Product was sold over the dock to private individuals, restaurants, or other markets without passing through the traditional system of processors established for other fish species. In many cases, only "tails" were sold and ex-vessel prices were quite high dependent upon the size, or count of tails per pound. From 1962 through 1979 annual harvests averaged almost 18,000 pounds of whole shrimp. This level of harvest would be worth approximately \$90,000 annually at current prices. Since 1980 effort and resulting harvests

have increased steadily. Fishermen have entered and utilized the fishery as a major income source. Harvests since 1980 have averaged over 220,000 pounds. Based upon a current average value of \$3.05 per pound of whole shrimp, this average recent harvest has an ex-vessel value of approximately \$670,000.

Management is limited to collecting fish ticket information and identifying known fishing areas. Very little research has been conducted on the distribution and abundance of spot prawns in Southeast Alaska and Yakutat, especially since the early 1970's. Research during the late 1960's and early 1970's had been accomplished by various agencies to determine the most efficient style of pot utilized in the fishery. Pots studied were primarily of the rectangular variety, with various tunnel configurations.

Regulations in the Southeast Alaska shrimp pot fishery include a limit of 150 pots per vessel in Districts 1 through 15, and specifications that pots should be secured with bait removed and doors open if unattended for longer than a two-week period of time. Pot termination devices have been defined for shrimp pots. Open seasons and GHRs have been established for some fishing districts. Due to allocation arguments, the accounting period for the GHRs has oscillated between May (for a primary income summer fishery) to October (for a supplemental income fall fishery). Present open seasons provide for an allocation to the fall fishery. The GHRs were initially established at the high catch levels for the major fishing districts of 1, 2, 3, and 7. These GHRs have been repealed based upon allocation and stock abundance arguments provided by industry to the Board of Fisheries. A liberal GHR of 75,000 to 100,000 pounds was established for Districts 6 and 8 to allow continued fishing in these districts while maintaining a

ceiling to prevent overexploitation. Effective October 1, 1986 a minimum mesh restriction of 1 3/4 inches, stretch measure, went into effect to assist in the escapement of the smaller sized shrimp in the harvest.

Shrimp Otter Trawl Fishery

The first significant otter trawl landings for shrimp were reported during the 1975/76 season. Locations producing significant harvests included Yakutat Bay, Lituya Bay, Glacier Bay, and Icy Bay. The most significant and consistent fishery first occurred in Yakutat Bay. During the 1980/81 season approximately 1.8 million pounds, of primarily pink shrimp, were harvested from Yakutat Bay. With the lack of processing facilities in the Yakutat Bay area, shrimp harvested in this fishery were landed in Kodiak, Seward, or Washington and Oregon ports. Effort, and subsequently harvests, have been sporadic during recent seasons. Most recent effort has been centered around the Icy Bay area. Statistical Area D harvests since 1980/81 season have averaged 190,000 pounds, which would have an ex-vessel value of approximately \$95,000 based upon current prices.

Regulations pertinent to this fishery include a prohibition against shrimp trawling in Lituya Bay due to the subsistence use of the coonstripe shrimp resource in this area by other user groups; a prohibition against shrimp trawling in Glacier Bay by the National Park Service due to the use of shrimp as a food source by the humpback whale; prohibitions against otter trawl fishing in the traditional beam trawl areas of Districts 6, 8, and 10; a prohibition against

trawling in portions of Yakutat Bay due to the use of that area by shrimp pot fishermen and subsistence users; a Yakutat Bay fishing season of June 21 through February 14 with a harvest guideline of 30,000 pounds per month. Stock abundance estimates for pink and side-stripe shrimp in Yakutat Bay have been determined by a series of shrimp research cruises. The last stock abundance research cruise occurred in Yakutat Bay during September 1984. Point estimates since 1980 have ranged from 1.84 to 6.46 million pounds. Stock abundance research cruises have not been accomplished in Icy Bay. Fishing restrictions for Icy Bay have not been established.

SEASON SUMMARY

Shrimp Beam Trawl Fishery

The 1988/89 shrimp beam trawl harvest totaled 1,496,854 through November 1988 when the last compilation occurred. Effort consisted of 18 fishing vessels making 416 landings. Fishing intensity was high this season, as it was during the past three seasons. The major processing facility utilized a second shift to reduce the backlog of unprocessed shrimp that occurred on occasion during the season. District 8 was closed by Emergency Order, 1-M-13-88, on July 4, 1988 after a harvest of 460,900 pounds of primarily pink shrimp. This harvest was equally split between the months of May and June. With the closure of District 8, significant effort shifted to District 6. On September 2, 1988 District 6 was closed by emergency order (1-M-23-

88) after a harvest of 937,400 pounds of shrimp. The major portion of this harvest was taken during the months of May and July. Dockside samples from these two major districts were collected during the fishery. These samples have not been fully analyzed as of this writing, but length frequency subsamples indicate that three size-classes were present in strength in the fishery. This information also indicates that the fishery occurred during the growth and recruitment periods this season.

After the closure of District 6, a petition to reopen Districts 6 and 8 was received. The petition requested two options be considered. First, an increase of the GHR to allow more summer fishing. Second, if no additional summer fishing would be allowed, that a winter harvest occur. The basis of the petition was that increased fishing was warranted due to extremely good stock conditions. The first option was rejected since the fishery was occurring during the growth and recruitment period. The second option was accepted for a limited harvest (50,000 to 100,000 pounds) from each district beginning on November 1, 1988. This would provide for an opportunity to evaluate a fishery on better quality winter shrimp. Information available to the Department supported the industry contention that stock conditions appeared above average. As of the date of this writing 7 vessels have participated in the winter harvest which totals 98,000 pounds from District 8, and 10,000 pounds from District 6. District 8 closed by emergency order (1-M-30-88) on December 16, 1988. It is expected that fishing effort will shift to District 6 where the winter harvest will continue. Pink shrimp harvested have been of good size and quality, a small size-class is evident, and females have external eggs. Approximately 30% of the shrimp harvested in the winter fishery have

been sidestripe shrimp. It appears that the winter harvest will be successful and meet the objectives of the petition request.

The ex-vessel value of the 1988/89 shrimp beam trawl fishery is approximately \$321,300, based upon landings through November 1988. These landings totaled almost 1.5 million pounds. By seasons end additional harvest will have occurred increasing this value.

Shrimp Pot Fishery

The 1988 shrimp pot fishery harvested 310,602 pounds through November 1988. Harvests for the month of December have averaged approximately 34,000 pounds during recent years. Assuming this catch rate holds during December 1988, a total harvest of approximately 345,000 pounds can be anticipated for the complete calendar year. This would be the highest harvest recorded since the fishery began. One hundred and six permits have been fished so far this year. This is a near record effort level. Number of pounds per landing and number of pounds per vessel are slightly depressed from 1987 figures, and number of landings is slightly above the 1987 figure. Markets continue to be good for spot prawns, which is the target species of this fishery.

District 1 contributed a harvest of 116,600 pounds, which was over 37 percent of the total regional harvest. It is possible that an additional 20,000 pounds will be landed from this district during December 1988. District 2, with a harvest of 58,900 pounds was the next most important fishing district.

District 7 with a harvest of 36,300 pounds was the third most important district, followed by District 10 with 25,100 pounds, District 3 with 21,400 pounds, District 9 with 19,500 pounds, and District 13 with 13,700 pounds. Over 32% of the harvest was taken during January and February, with another 47% taken during October and November. Once again, harvests from the Yakutat Bay area are small compared to harvests from previous years.

While effort was available in Districts 4, 5, 8, 11, 12, 14, 15, and 16 it is not known if the relatively low harvests reported from these districts are indicative of low stock abundance, low effort, or other factors. District 1 was fished very heavily this year and the result was the highest harvest on record for this district. The harvest from District 2 was approximately 50% of the 1987 harvest, and the lowest harvest of the last three years.

Based upon the harvest to date of 310,600 pounds, the shrimp pot fishery for 1988 is valued at approximately \$804,000.

Shrimp Otter Trawl Fishery

There was no reported harvest of shrimp utilizing otter trawl gear from Statistical Areas A and D this past season.

ISSUES

Shrimp Beam Trawl Fishery

Harvest data and a limited amount of effort data resulting from fish ticket data is not an accurate scientific measure of population abundance due to factors which include market changes, gear changes, new entrants and knowledge level of the fishermen. A project proposal to assess the feasibility of estimating shrimp stock abundance using the area-swept method and commercial beam trawls have been developed and submitted for approval and funding. This project also included staff time for sampling the catch for data on size class contribution, molting period, egg extrusion period and egg-hatch period. At this time, the proposal is under consideration. Considering the present level of processing capacity and increasing fishing effort an accurate estimation of population levels and life history parameters will be essential to proper fishery management. Current GHRs were established based upon historic harvests during periods when fishing effort was relatively low and the catch rate was correspondently low. It is not known if these GHRs are appropriate for current stock conditions.

The small dockside sampling accomplished during the 1987/88 season was expanded this season. Sampling was still accomplished on a time available basis. Most samples taken during the 1988/89 season have not been analyzed. Potential information of importance to the manager includes relative strength of size-classes contributing to the harvest, period of transition from female to male, time of recruitment into the fishery, and periods of molting and growth. In addition,

skippers were interviewed to start a data base on catch per unit of effort (CPUE).

Limited data indicates that fishing is occurring during the growth and recruitment period, and possibly during the mating period. If the fishery continues to intensify, fishing during these sensitive life-history stages could negatively effect stock condition and future recruitment.

Some fishermen have voluntarily rehung their nets utilizing a larger mesh size. This could assist stock conservation by harvesting a larger shrimp and reducing fishing mortality on the smaller segments of the stock. One potential risk would be increasing the harvest rate on the mature shrimp to a point which could result in a decrease in stock reproduction. It appears that this management measure should be considered more fully.

Other potential issues would include consideration for an increase in the minimum mesh size for a winter sidestripe fishery, consideration for an increase in the minimum mesh size for pink shrimp, establishing a separate winter GHR for sidestripe shrimp, and increasing the present GHR for pink shrimp.

Shrimp Pot Fishery

There are three major issues concerning the shrimp pot fishery. These are management of the fishery, mesh restriction enforcement, and season allocation.

The management and research program has developed much more slowly than the fishery. Much like the beam trawl fishery, most management is passive and little information is available to scientifically manage the fishery. Data available is limited to fish ticket information, with little opportunity for dockside sampling, skipper interviews, or other data gathering. Discussions on management changes have primarily centered on CPUE. CPUE data from Southeast Alaska has been reviewed. Present data is not sufficiently detailed and abundant to manage on a CPUE basis. Recent information from British Columbia identifies a management system based upon CPUE information from resource agency surveys, mandatory fishery logbooks as a condition of licensing, information from fishery patrol officers which checks mesh compliance and logbook accuracy, and fish ticket data. British Columbia has implemented minimum mesh requirements and has developed, but not implemented, a regulation on minimum shrimp size. This management system is very time consuming, requires considerable staff support and funding support, requires detailed data collection and analysis, and requires consistent enforcement effort on the fishing grounds. In Washington, management is currently conducted using restricted fishing time based upon resource surveys and provides for small shrimp escapement utilizing minimum mesh restrictions and pot design specifications.

The minimum mesh restriction in Region 1 regulations has been interpreted differently than originally intended. Enforcement problems currently exist with this regulation with regard to the variety of pot designs utilized in the fishery, the placement of the meshes on the pot, and the size of the panel required. Until this issue is resolved, the mesh restriction regulation will not provide

the biological escapement that was needed for conservation. Washington requires that the entire pot be meshed with a minimum size mesh, so that escapement occurs at any location on the pot. British Columbia meshed pots must be completely covered with the minimum size mesh, and a 3/4 inch peg must pass through the meshes without stretching or altering the mesh opening. Solid pots must have the minimum size mesh placed in the tunnel without any distortion of the shape of the meshes, using the same 3/4 inch peg system. For wire mesh pots, the bottom and two opposite sides must be constructed of square mesh material of such size that a 3/4 inch peg would pass through each mesh. British Columbia did consider a variety of temporary pot modifications for use until the effective date of the new regulation.

The last issue concerning the shrimp pot fishery involves the fishing season and/or the accounting period for GHRs. Currently the fishing season in the important harvest districts (Districts 1, 2, 3, 7) provides for a fall and winter fishery, which extends from October 1 through February 28. These districts are closed during the March to May egg hatch period, and through the summer months. Months of April through August probably encompass the growth and recruitment period. October is the beginning of the egg extrusion period. The regulatory fishing season was implemented to eliminate fishing mortality during the growth and recruitment period and to allocate the fishery to the fall and winter months, which is an allocation to fleet members utilizing the fishery for supplemental income. There are members of the fleet that consider shrimp pot fishing as a primary source of income, and would prefer to harvest the resource during the summer months.

Shrimp Otter Trawl Fishery

Management is limited to the collection of fish ticket information. Research surveys to estimate the population level have been conducted in Yakutat Bay during past years. The last completed survey occurred in September 1984. At the current level of fishing in Yakutat Bay, existing regulations are probably sufficient to provide for conservation concerns.

Population estimates have not been accomplished for Icy Bay. With the level of fishing effort experienced during the past two seasons, there is little need to accomplish such research. However, if a resurgence of effort should occur then management information would not be sufficient to provide for proper resource conservation.

OUTLOOK

Shrimp Beam Trawl Fishery

It is likely that the three strong size-classes evident in the fishery in major districts during the past season and the high harvest rates indicate reasonable recruitment and healthy stock conditions for the next season. A 1989/90 harvest very similar to recent harvests of 1.5 million pounds can be expected unless extraordinary mortality factors

effect the stock. Available data is not sufficient to determine future harvests with any degree of scientific certainty.

Shrimp Pot Fishery

It is difficult to provide a reasonable prediction of future harvests and stock condition with the little information that is available. Considering that the market condition appears strong, existing regulations are not altered appreciably, pot mesh regulations are clarified, and effort does not increase, I would anticipate that the 1989 harvest would be similar to the 1988 harvest.

Shrimp Otter Trawl

Present information is not sufficient to predict future harvests with any degree of certainty. Previous estimates of population levels in Yakutat Bay and existing regulations are conservative. Maximum harvests in Yakutat Bay should not effect stock conditions appreciably. Fishing effort levels will be dependent upon exvessel prices and other fishing opportunities.

Table 1. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) shrimp beam trawl catch, number of vessels, number of landings, pounds per vessel, and pounds per landing, 1955 to present.

Year/ Season	Catch in Pounds	Number of Vessels	Landings	Pounds per Vessel	Pounds per Landing
1955	1,777,122	15		118,475	
1956	3,301,598	15		220,107	
1957	2,350,449	10		235,045	
1958	7,605,871	14		543,277	
1959	5,518,843	22		250,857	
1960	3,343,373	21	1,007	159,208	3,320
1961	4,212,300	20	1,394	210,615	3,022
1962	3,884,050	22	1,400	176,548	2,774
1963	3,110,340	20	1,080	155,517	2,880
1964	2,793,101	13	1,092	214,854	2,558
1965	2,941,429	13	1,338	226,264	2,198
1966	3,784,597	14	1,663	270,328	2,276
1967	2,203,753	13	1,105	169,519	1,994
1968/69	2,003,753	12	925	166,979	2,166
1969/70	1,840,727	10	952	184,073	1,934
1970/71	742,404	8	477	92,801	1,556
1971/72	1,050,978	8	592	131,372	1,775
1972/73	797,387	9	421	88,599	1,894
1973/74	674,386	8	460	84,298	1,466
1974/75	1,205,617	9	434	133,957	2,778
1975/76	983,609	12	450	81,967	2,186
1976/77	768,930	14	476	54,924	1,615
1977/78	949,043	10	404	94,904	2,349
1978/79	1,033,325	9	519	114,814	1,991
1979/80	956,927	17	982	56,290	974
1980/81	843,737	21	920	40,178	917
1981/82	918,975	15	523	61,265	1,757
1982/83	1,397,026	15	455	93,135	3,070
1983/84	1,768,148	18	668	98,230	2,647
1984/85	1,289,970	23	809	56,086	1,595
1985/86	428,184	16	249	26,762	1,720
1986/87	2,202,169	16	427	137,636	5,157
1987/88	1,758,340	25	404	70,334	4,352
1988/89 ¹	1,496,854	18	416	83,159	3,598

¹ Most recent year's data should be considered preliminary.

Table 2. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) shrimp beam trawl harvest in thousands of pounds, by month and season 1969/70 to present.

Season	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	Total
1969/70	326.7	280.2	78.8	129.1	184.7	241.2	119.6	165.2	160.0	100.6	32.4	22.4	1,840.7
1970/71	131.3	105.1	65.5	79.8	49.7	64.3	54.8	59.2	59.9	56.8	2.8	13.2	742.4
1971/72	139.0	106.3	144.5	106.5	69.7	78.3	101.6	71.1	66.0	121.1	38.7	8.2	1,051.1
1972/73	168.5	126.4	77.2	66.1	65.8	44.7	64.0	46.3	81.6	42.2	6.1	8.5	797.4
1973/74	96.3	124.1	72.6	73.7	45.0	32.0	59.1	64.8	60.3	29.2	8.8	8.5	674.4
1974/75	160.9	199.2	202.4	168.0	120.1	61.4	73.9	90.8	104.2	21.6	0.7	2.4	1,205.6
1975/76	180.7	130.3	67.2	92.6	112.3	154.5	73.0	77.8	38.9	46.1	3.6	6.7	983.6
1976/77	78.8	171.7	120.0	118.8	61.8	37.4	55.2	33.3	65.0	25.7	0.5	0.8	768.9
1977/78	73.7	235.3	147.9	166.6	126.2	48.3	29.5	18.7	81.2	21.7	0.0	0.0	949.1
1978/79	107.0	130.9	140.6	240.2	112.0	93.1	67.8	36.0	72.3	22.5	8.3	2.5	1,033.3
1979/80	98.2	154.9	146.6	177.4	104.3	55.1	58.4	39.6	66.3	48.2	3.5	4.4	956.9
1980/81	153.8	168.6	164.9	153.7	54.2	30.2	35.5	12.2	33.6	31.6	1.8	3.7	843.7
1981/82	165.1	183.4	124.0	168.8	81.1	52.8	36.2	48.3	33.0	22.3	0.9	3.1	918.9
1982/83	181.1	171.7	168.8	159.4	134.0	50.1	60.7	82.0	152.6	119.8	64.4	52.5	1,397.1
1983/84	436.3	249.0	287.0	218.2	138.5	132.0	83.3	86.9	100.3	16.2	9.0	9.6	1,766.1
1984/85	156.3	252.5	269.9	232.8	130.9	59.5	61.8	49.7	51.9	22.5	1.1	1.0	1,290.0
1985/86	125.4	105.3	46.1	23.2	39.1	13.8	31.3	27.0	8.6	7.7	0.8	0.0	428.2
1986/87	294.0	507.8	576.0	446.8	372.0	0.7	0.0	1.8	1.4	0.4	0.3	1.2	2,202.2
1987/88	634.0	721.0	291.2	90.8	0.1	0.1	1.3	7.6	5.9	2.7	2.6	1.1	1,758.3
1988/89 ¹	650.5	369.0	253.5	137.9	2.6	2.5	80.8	0.0	0.0	0.0	0.0	0.0	1,496.9

¹ Most recent year's data should be considered preliminary.

Table 3a. Statistical Area A (Southeastern) and Statistical Area D (Yakutat) shrimp beam trawl fishery catch in thousands of pounds by season and district, 1969/70 to 1978/79.

Dist	Year									
	69/70	70/71	71/72	72/73	73/74	74/75	75/76	76/77	77/78	78/79
1	0.0	0.3	3.2	0.0	0.8	0.7	1.7	1.6	0.0	1.7
2	0.0	0.0	0.0	0.0	0.0	1.3	0.1	0.0	0.0	0.0
3	0.0	0.0	0.0	0.7	0.0	0.0	4.8	1.1	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5	1.2	0.0	0.0	0.0	0.0	0.0	39.3	0.0	0.0	0.0
6	865.5	344.4	442.4	451.5	260.0	973.2	812.3	620.9	717.7	625.0
7	0.0	38.1	67.0	35.7	48.7	10.4	14.2	29.2	40.3	140.1
8	609.7	158.5	285.7	219.6	323.4	212.4	84.5	85.5	176.0	261.9
9	13.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	350.1	201.1	252.3	89.9	41.6	6.7	26.3	27.9	14.1	3.4
11	0.9	0.0	0.0	0.0	0.0	0.7	0.5	2.7	1.0	1.2
12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
181	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
183	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
184	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
186	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
191	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	1,840.7	742.4	1,051.0	797.4	674.4	1,205.6	983.6	768.9	949.1	1,033.3
Landings	952	477	592	421	460	434	450	476	404	519
Vessels	10	8	8	9	8	9	12	14	10	9

Table 3b. Statistical Area A (Southeastern) and Statistical Area D (Yakutat) shrimp beam trawl fishery catch in thousands of pounds by season and district, 1979/80 to present.

Dist	YEAR									
	79/80	80/81	81/82	82/83	83/84	84/85	85/86	86/87	87/88	88/89 ¹
1	6.4	3.2	6.7	2.5	7.2	0.1	0.8	0.7	0.0	2.8
2	1.5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
3	2.4	1.1	1.3	0.6	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
5	0.7	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0
6	427.4	416.9	790.4	1,199.6	1,015.4	544.7	235.7	1,667.1	1,231.3	943.7
7	109.8	77.9	31.5	11.8	138.6	101.2	29.7	99.6	75.8	2.9
8	405.7	342.5	88.3	51.0	545.6	607.9	160.7	431.6	454.1	536.9
9	0.0	1.8	0.0	97.1	21.8	0.0	0.0	0.0	0.0	0.0
10	2.8	0.0	0.0	34.3	26.3	34.7	1.0	3.1	14.8	10.5
11	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.0
12	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
15	0.1	0.2	0.2	0.1	2.0	0.9	0.2	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
181	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
183	0.0	0.0	0.0	0.0	11.0	0.0	0.0	0.0	0.0	0.0
184	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
186	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	0.0
191	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<hr/>										
Total	956.9	843.7	919.0	1,397.1	1,768.1	1,289.9	428.2	2,202.2	1,758.3	1,496.9
Landings	982	920	523	455	668	809	249	427	404	416
Vessels	17	21	15	15	18	23	16	16	25	18

¹ Most recent year's data should be considered preliminary.

Table 4. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) shrimp beam trawl harvest (landings) by district and month, 1988/89.

Month	District						Total Vessels	Total Catch
	6	7	8	10	11	186		
May	410.1 (50)	*	239.9 (118)				14	650.0
June	146.1 (16)		222.8 (80)				13	368.9
July	243.4 (40)		*	*			4	243.4
August	137.9 (33)						4	137.9
Sept							1	*
Oct		*					3	*
Nov	6.3 (4)		72.7 (65)	*			7	79.0
Dec								*
Jan								
Feb								*
Total Harvest	943.8	*	535.4	*				1,479.2
Landings	143	*	264	*				432
No. Vessels In Fishery	8	*	15	*				18

* Where number of vessels participating is three or less, information is confidential.

Table 5. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) shrimp pot fishery catch, number of landings and CPUE, 1962 to present.

Year	Catch in Pounds	Number of Permits Fished	Number of Landings	Pounds Per Landing	Pounds Per Vessel
1962	488		6	81	
1963	686		9	76	
1964	3,669		11	334	
1965	0		0		
1966	*		*	*	
1967	38,900		113	344	
1968	38,209		65	588	
1969	40,196	5	53	758	8,039
1970	32,833	5	42	782	6,567
1971	10,122	4	24	422	2,531
1972	26,963	7	44	613	3,852
1973	*	*	*	*	*
1974	15,954	5	18	886	3,191
1975	5,841	5	11	531	1,168
1976	12,451	6	31	402	2,075
1977	19,185	7	17	1,129	2,741
1978	28,202	9	82	344	3,134
1979	23,305	10	30	777	2,331
1980	63,095	26	146	432	2,427
1981	86,803	34	227	382	2,553
1982	174,593	52	428	408	3,358
1983	289,964	87	549	528	3,333
1984	255,825	118	738	347	2,168
1985	254,858	106	749	340	2,404
1986	252,670	93	602	420	2,717
1987	314,578	96	641	491	3,277
1988 ¹	310,602	106	653	476	2,930

¹ Most recent year's data should be considered preliminary.

* Where number of vessels participating is three or less, information is confidential.

Table 6. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) shrimp pot fishery catch in thousands of pounds by year and month, 1969 to present.

Year	Month												Total	Landings	Permits
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec			
1969	4,246	5,669	13,475	5,471	6,473	3,410	0	0	0	0	0	1,452	40,196	53	5
1970	4,594	4,638	5,094	2,470	4,303	6,481	976	0	0	282	782	3,213	32,833	42	5
1971	1,649	3,520	1,268	0	0	0	0	0	1,970	231	938	546	10,122	24	4
1972	1,846	1,588	4,301	10,923	3,788	1,750	0	2,142	0	625	0	0	26,963	44	7
1973	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
1974	0	1,350	4,456	7,274	0	1,665	0	0	0	362	280	567	15,954	18	5
1975	70	567	1,265	675	0	0	956	0	0	0	362	1,946	5,841	11	5
1976	580	1,078	1,617	1,484	1,463	1,279	1,597	1,167	0	0	540	1,646	12,451	31	6
1977	10,400	0	1,454	6,466	0	0	310	0	100	369	86	0	19,185	17	7
1978	9,943	1,351	1,633	5,250	3,890	255	690	90	2	560	11	4,527	28,202	82	9
1979	0	0	0	3,239	5,109	3,168	3,946	1,644	3,589	1,790	820	0	23,305	30	10
1980	799	1,544	3,728	2,479	12,388	8,421	7,840	1,519	11,112	9,410	3,149	706	63,095	146	26
1981	1,679	1,373	4,041	7,443	8,275	7,171	22,552	9,964	5,717	11,413	2,863	4,312	86,803	227	34
1982	2,625	5,113	9,907	9,955	3,288	4,982	32,589	47,300	15,039	20,566	7,042	16,187	174,593	428	52
1983	9,214	25,817	7,468	990	4,501	3,281	50,712	42,895	58,223	38,234	34,208	14,421	289,964	549	87
1984	12,224	20,290	22,311	24,382	30,596	29,437	8,804	8,038	4,305	32,313	36,604	26,521	255,825	738	118
1985	29,795	35,681	9,076	8,467	29,125	19,873	15,909	17,608	18,964	15,191	26,696	28,473	254,858	749	106
1986	28,932	30,459	27,101	10,088	2,416	3,386	8,084	7,783	3,389	45,647	45,443	39,942	252,670	602	93
1987	45,660	61,393	24,912	7,546	5,349	2,392	5,591	3,639	4,930	64,088	47,576	41,502	314,578	641	96
1988 ¹	44,020	54,524	15,142	22,248	8,746	6,537	5,355	5,055	2,241	82,887	63,847	-0-	310,602	653	106

* Where number of vessels participating is three or less, information is confidential.

¹ Most recent year's data should be considered preliminary; season in progress.

Table 7. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) shrimp pot fishery catch in thousands of pounds by year and district 1969 to present.

Dist	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988 ¹
1	32.9	11.0	3.9	8.4	*	3.0	1.6	4.4	3.6	5.7	4.2	21.4	14.5	18.9	39.5	47.4	58.5	47.6	70.1	116.6
2	4.5	1.5	3.3	14.8	*	12.8	4.0	6.7	10.8	13.1	7.3	13.2	16.5	18.1	32.5	19.0	50.6	68.0	119.9	58.9
3		8.1			*		0.2	1.4			4.2	7.6	23.1	60.5	61.0	35.5	31.0	65.5	26.0	21.4
4					*						1.3	0.4			1.0			0.7	0.1	
5					*					0.7					0.9		0.2	0.1	0.9	*
6					*								4.5	4.5	13.6	4.7	4.4	5.7	1.2	*
7	2.8			1.7	*				4.8	3.8	5.0	15.4	19.2	28.2	73.1	82.7	57.6	26.3	44.7	36.3
8		1.1	0.9		*					4.5		0.8		2.2	4.9	15.0	5.5	3.4	1.6	2.1
9				0.2	*							2.7	2.1	4.1	6.0	1.0	1.9	0.6	6.2	19.5
10		0.2	2.0	1.9	*								2.1	0.0	5.5	13.3	26.5	15.5	20.9	25.1
11					*								0.1	0.5		0.2	1.3	0.5	1.2	2.2
12					*						1.3	0.0	2.0	1.1	0.5	3.7	1.6	2.3	5.6	9.2
13					*					0.4	0.1	0.5	0.5	15.8	15.2	21.1	9.0	6.5	11.7	13.7
14					*							1.0	1.4	0.2	0.1	0.1	0.4	0.1	0.1	1.7
15					*												0.2	0.3	0.8	
16					*									20.5		4.0	3.6	2.8	0.8	*
183		10.1			*	0.1						0.1	0.6	0.0	36.3	6.5	2.3	6.7	2.6	2.2
186					*											1.6				
Total	40.2	32.8	10.1	27.0	*	16.0	5.8	12.5	19.2	28.2	23.3	63.1	86.8	174.6	290.0	255.8	254.9	252.7	314.6	310.6
Landings	53	42	24	44	*	18	11	31	17	82	30	146	227	428	549	738	749	602	641	653
Vessels	5	5	4	7	*	5	5	6	7	9	10	26	34	52	87	118	106	93	96	106

¹ Most recent year's data should be considered preliminary.

* Where number of vessels participating is three or less, information is confidential.

NOTE: Number of vessels reported as actual number of vessels fishing in 1969 through 1974 season, and number of permits fished from 1974 to the present.

Table 8. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) shrimp pot harvest in thousands of pounds (landings) by district and month, 1988.

Month	District																		Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	183		
Jan	20.8 (30)	7.7 (18)	* *			* *	9.1 (21)	* *		* *			0.7 (4)				0.3 (5)	44.2	
Feb	23.9 (34)	13.1 (34)	* *			* *	8.8 (24)	* *		* *		1.6 (8)	3.3 (12)	* *			0.5 (9)	59.9	
Mar										4.8 (14)		2.3 (9)	2.7 (11)					9.8	
Apr					* *				* *	9.8 (27)	1.2 (4)	1.8 (13)	2.0 (9)					22.2	
May					* *	* *		* *	2.5 (6)	1.8 (13)	* *	1.9 (6)	1.3 (4)				* *	8.8	
Jun								* *	3.3 (5)	1.6 (9)	* *	* *	* *				0.5 (9)	6.6	
Jul					* *			* *	1.8 (4)	1.3 (5)				* *			0.5 (5)	5.4	
Aug						* *		* *	2.8 (5)	1.4 (10)				* *		* *	* *	5.1	
Sep								* *	* *	0.6 (5)							* *	2.3	
Oct	38.9 (47)	24.9 (45)	2.3 (11)				11.1 (17)	* *	* *	2.8 (7)	* *	* *	* *				* *	83.1	
Nov	33.0 (43)	13.3 (26)	7.2 (11)				7.3 (16)	* *	* *	* *		* *	2.4 (5)					63.9	
Dec ¹																			
Total	116.6 (154)	59.0 (123)	21.3 (25)		* *	0.4 (7)	36.3 (78)	2.3 (11)	19.5 (27)	25.3 (95)	2.2 (8)	9.2 (40)	13.7 (50)	1.7 (5)	0 0	* *	2.2 (36)	310.6 (653)	

¹ Season in progress.

* Where number of vessels participating is three or less, information is confidential.

Table 9. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) shrimp otter trawl fishery catch, number of landings and CPUE, 1975/76 to present.

Year/ Season	Catch in Pounds	Number of Landings	Pounds Per Landing	Number of Vessels	Pounds Per Vessel
1975/76	*	*	*	*	*
1976/77	150,800	4	37,700	*	*
1977/78	0	0		0	0
1978/79	0	0		0	0
1979/80	66,220	8	8,278	*	*
1980/81 ¹	2,051,966	38	53,999	19	107,998
1981/82	36,365	4	9,091	*	*
1982/83	138,246	8	17,281	*	*
1983/84	417,362	11	37,942	6	69,560
1984/85	202,259	6	33,710	4	50,565
1985/86	*	*	*	*	*
1986/87	480,374	11	43,670	4	120,094
1987/88	10,448	5	2,090	*	*
1988/89 ²	0				

¹ 1980/81 season includes a catch of 450,000 pounds reported out of Yakutat Bay in August and September but not reported via fish tickets.

² Most recent year's data should be considered preliminary.

Table 10. Historic shrimp otter trawl harvests from District 183, which includes Yakutat Bay.

Year/ Season	Harvest In Round Pounds	Number of Landings	Pounds Per Landing
1979/80	*	*	*
1980/81 ¹	1,799,899	21	85,709
1981/82	*	*	*
1982/83	*	*	*
1983/84	*	*	*
1984/85	*	*	*
1985/86	0		
1986/87	0		
1987/88	0		
1988/89 ²	0		

¹ 1980/1981 season includes 450,000 pounds reported checking out of Yakutat Bay during the fishery (August 1980) but not reported via fish tickets.

² Most recent year's data should be considered preliminary.

REPORT TO THE BOARD OF FISHERIES
SOUTHEAST ALASKA (STATISTICAL AREA A)
AND
YAKUTAT (STATISTICAL AREA D)
MISCELLANEOUS SPECIES
1988/1989

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BACKGROUND

Abalone

The Alaskan abalone fishery targets the pinto or northern abalone, (*Haliotis kamschatkana*), which inhabits the rocky, lower intertidal and subtidal surge zones of the outer coasts of Southeast Alaska. Commercially harvestable quantities of abalone occur in parts of Districts 3, 4, and 13. Life history information for this species in Alaska is very limited. Information from other North Pacific locations is useful in understanding the basic biology of this species. Tagging studies indicate it is a slow growing, long-lived species. Spawning probably occurs during the summer and through early autumn in the most productive areas. Size frequency information indicates that, in at least some areas, a climax population may have existed prior to recent commercial exploitation. Recruitment levels appear to be low and sporadic. Fecundity increases greatly with increasing shell length. Known predators include rockfish, starfish, octopus, sea otter, and man. Throughout the range of various abalone species, exploitation has resulted in stock depletion and restrictive management.

Abalone can be picked by hand from the shoreline during extreme low tides. However, the commercial fishery utilizes SCUBA or Hooka gear and most of the harvest occurs subtidally. Fishing success is variable depending upon weather, substrate, vegetative growth, visibility, diver experience, abalone abundance, and other factors.

Harvests of Alaskan abalone were highly variable from 1964 through 1976. In 1977, a reduced supply of abalone products on the world market, the acceptance of the pinto abalone in the Japanese market, favorable monetary exchange rates for the yen, and relaxed Alaskan harvest regulations improved the commercial feasibility of this fishery. Effort increased in 1977 and resulted in high harvests. Seasonal harvests since 1977/78 have averaged 141,979 pounds, although the annual harvest has been restricted to about one-third that in recent years by more conservative management. The number of participating vessels or operators has exceeded 40 in some years. The estimated average ex-vessel value was approximately \$0.5 million until recent seasons.

Management strategies established in the commercial fishery include a closed season during sensitive life history stages of spawning and settling, a minimum legal size to insure some degree of reproduction prior to recruitment into the fishery, closed waters to insure that some stocks are not subject to commercial exploitation, and guideline harvest ranges intended to protect the fisheries from commercial overexploitation. The management objective is to provide for commercial harvests with an established guideline harvest level of 8,000 pounds for District 13, and a range of 25,000 to 50,000 pounds for all other districts combined. The fishing season opens by regulation on October 1.

Scallops

The weathervane scallop, (*Pactinopectin caurinus*), is commercially harvested from offshore beds in Statistical Area D (Yakutat) by vessels using scallop dredges. Studies conducted during the developmental stages of this fishery indicated an average size of maturity for this species of approximately three inches in shell length.

The early years of the fishery, 1968 and 1969, were very productive. They were followed by a few years of relatively low effort and harvest. The fishery expanded again during the mid-1970's, followed again by low effort and harvest during the late 1970's. Effort and harvest increased once again from 1980 through 1982, decreased in 1983, increased in 1984, decreased in 1985, and increased through 1987. Some of these fluctuations in effort and harvest may have been a result of market conditions and the presence of more lucrative alternative fishing opportunities. However, a trend of high harvests followed by a subsequent decline, and then subsequent high harvests, is evident in the data and may be an indication of the need for a recovery period after periods of high harvest. In most years the harvest is taken by very few vessels. The catch for the last five years has averaged about 56,758 pounds of shucked meats. Current ex-vessel price per pound is approximately \$3.50.

The primary conservation strategy employed in this fishery is a four inch minimum ring diameter in scallop dredges. In theory, this provides for some escapement of mature scallops. A permit registration system provides information on effort levels and the fish

ticket system reports the harvest in terms of pounds of shucked meats. Shucked meats represent about 11% of the whole weight of the live scallop.

Geoduck

Known geoduck clam, (*Panope generosa*), beds occur sporadically in the central and southern portion of Southeast Alaska, primarily near the outside coast. Studies done in other locations, specifically Puget Sound and British Columbia, indicate that this clam may live to be in excess of 100 years old. It appears that Southeast Alaska is the extreme northern edge of the geographic range and recruitment may be low and inconsistent. Reasonably high levels of PSP have been identified with this clam, but have been confined to the viscera. Current regulations of the Department of Environmental Conservation prohibit the sale of unprocessed clams, and the disposal of waste portions of the clam can only be accomplished in a prescribed manner. These factors result in a close working relationship between the Department of Fish and Game and the Department of Environmental Conservation staff's, relative to season openings. Each individual delivered lot must be certified free of PSP prior to marketing. These conditions also necessitate a close working relationship between industry representatives and state agencies. Prior to 1985 a few geoducks were test marketed or sold for bait. Starting in 1985, state grants were used to find and qualitatively assess commercial beds in the Ketchikan, Petersburg-Wrangell, and Sitka management areas. A number of potential commercial beds were located. Procedures for testing and certifying the product for human consumption were

established. Harvestable biomass was estimated for a few promising beds. As a result, three beds in the vicinity of Noyes Island were certified for harvesting. Finally, two processors were certified for processing.

In late 1985, the initial permit was issued for the commercial harvest of geoduck clams. This harvest was conducted under a management plan developed to control the development of the fishery, to prevent the depletion of the beds in question, and was based upon population estimates. During the 1985/86 season, 154,582 pounds were harvested of the 300,000 pound five year quota in the Noyes Island area. During the 1986/87 season, only 28,191 pounds were harvested. This drop in harvest was due to poor marketing conditions and high operational costs rather than lack of product. Increased interest in this fishery began after department personnel completed a survey and population estimation project on the west side of Gravina Island. During the 1987/88 season a harvest of 124,568 pounds occurred in the Vallenar Bay area of Gravina Island. This area was closed by Emergency Order (1-M-8-88) on May 16, 1988. Information indicates an average weight of 2.9 pounds per individual geoduck landed. An additional 60,577 pounds were harvested from Noyes Island.

Management goals in the geoduck fishery are to provide for low exploitation rates for this long-lived species with low and sporadic recruitment. Harvests are restricted to beds which have been surveyed, and for which biomass estimates are available. After an area has been surveyed, and a population estimate completed, the guideline harvest level is determined based upon a 2% fishing mortality. Area rotation is utilized in the Gravina Island and Noyes Island fisheries. After an area has been open and the guideline

harvest taken, that area is closed and is not reopened for another three to four fishing seasons. The fishery is monitored through the miscellaneous vessel registration/harvest permit system. Logbook information is usually a requirement of the permit system for geoducks. Other data is collected from the fishery as time and opportunities permit. Currently, the DEC does not permit the sale of live geoducks due to the PSP problem.

Sea Urchins

Sea urchins are found in the shallow waters of many portions of Southeast Alaska. Two species have drawn the interest of commercial operators, the green sea urchin, (*Strongylocentrotus drobachiensis*), and the red sea urchin, (*S. franciscanus*). Information to date indicates that the red sea urchin is the most abundant and more widely distributed. However, in some markets the green sea urchin, which is smaller, is preferred. From 1981 through 1983 small quantities of sea urchin roe were test marketed in Japan. In 1984, the first significant harvest occurred in the Ketchikan area with red sea urchins comprising the major portion of the harvest. In 1984, approximately 61,650 pounds were harvested. In 1985, the harvest climbed to 125,973 pounds. In 1986, the harvest increased dramatically to 282,384 lbs. In 1987, the catch rose to 652,965 pounds. The catch in 1987 was inflated by extension of the fishery through the summer months to monitor gonadal development. It is unlikely that another summer fishery will occur. The effort peaked during 1987 at thirty-six harvesters. In recent years, different processors have been involved each year with varying success. Roe

percentages have fluctuated greatly with the outer districts on the west coast of Prince of Wales Island maintaining a slightly higher level of roe maturity. Ex-vessel price has been quite variable, mainly ranging between \$.10 to \$.18 per pound, depending on roe maturity.

Due to the sporadic distribution and low population levels found so far in the Ketchikan area, harvest of green sea urchins has been minimal.

Management techniques for red sea urchin include area rotation, restricting harvests to only animals with test diameters between 3.0 to 4.5 inches, and a fishing season from October 1 through April 30, and guideline harvest levels. These items are included in the miscellaneous species harvest permit issued to each participant in this fishery. Harvest information is collected through fish tickets and collected logbook information.

Area rotation is utilized to assist in stock conservation by providing approximately two years between harvests for stock reproduction, growth, and recruitment. It allows for the controlled development of the fishery while providing information on stock distribution. Area rotation also protects localized stocks near the population center from being depleted, and ensures that at least one area close to Ketchikan is available for harvest each year.

The size limit was developed to ensure product quality and conservation of the resource. Industry has mainly been interested in roe obtained from urchins in this size range. Also, a review of the biological information available in the literature indicates that

larger urchins provide a protective spine canopy for survival of young urchins therefore ensuring future recruitment. Urchins smaller than the lower size range are left for recruitment into the fishery.

The open season coincides with the period of optimum roe quality. Closed periods protect stocks during sensitive reproduction and settlement stages.

Guideline harvest levels provide for controlled development of the fishery and also provide some assurance that overexploitation will not occur on localized stocks.

Currently, there is no management plan developed specifically for green sea urchins, (*S. droebachiensis*). Harvest of this species is handled through specific permit terms entered on the miscellaneous species permit. Such terms generally follow the principles described for red sea urchin, with the exception that the size limit is smaller due to the smaller maximum size of this species.

Sea Cucumbers

The harvest of sea cucumbers, (*Parastichopus californicus*), has been sporadic and minimal prior to 1987. Most of the harvest has occurred in the Ketchikan area. The 1987 harvest of approximately 80,000 individuals is the highest recorded. Harvesters have explored additional geographic areas during the past two years. Interest in other species of sea cucumber has been expressed. The processors primarily are interested in eviscerated sea cucumbers. Primary

processing includes the stripping of the five longitudinal muscles, and secondary processing occurs on the outer skin.

This fishery is in the early stages of development, and is managed through the use of fish ticket information, terms outlined in the miscellaneous species form, and the completion of mandatory logbooks by participants. Guideline harvest levels are set based upon the area between 0 and 60 feet in depth, a density estimate of 0.69 cucumbers per square meter (actual data from Vallenar Bay survey), and a harvest rate of 5%. This allows the collection of data on distribution, density, depth range, preferred habitat, and other data necessary to future management.

A draft management plan has been developed for this fishery. This draft plan includes the utilization of: guideline harvest levels based upon available area and density as described above; three-year rotational harvest cycle; miscellaneous species permits to control location of harvest, duration of harvest, and reporting requirements. Scientific information suggests that sea cucumbers may migrate to shallow waters to spawn during the spring and summer months. Eventually, it may be appropriate to close a portion of the year due to the vulnerability of overexploitation during sensitive life history periods when the stock is concentrated.

Octopus

Octopus, mainly *Octopus dofleini*, has been harvested in Southeast Alaska at minimal levels primarily as incidental catch in the shrimp

pot fishery. Since 1976, octopus landings have ranged between 324 and 17,262 pounds. Octopus has predominately been sold as bait in the longline fisheries. Ex-vessel price is around \$1.25 per pound. This fishery utilizes the fish ticket system and miscellaneous permit form for the collection of information necessary for the development of a future management plan and regulations. A management plan has not yet been developed for this fishery.

Squid

The commercial interest in squid, probably *Loligo opalescens*, has been very minimal and sporadic. There has been some interest in the use of purse seine gear for harvesting stocks on the west coast of Prince of Wales Island where they have been observed in shallower water in the spring. Only small harvests have occurred in this fishery. No permits for mechanical jigging machines, commonly used in other squid fisheries, have been issued in the Ketchikan area recently.

This fishery also uses the fish ticket system and the miscellaneous permit form as management tools. A management plan has not been developed for this species.

SEASON SUMMARY

Abalone

The 1988/89 abalone season opened on October 1, 1988, in all fishing districts. The fishery in District 13 was closed by Emergency Order (1-M-29-88) on November 2, after a seasonal harvest of 10,172 pounds. This harvest exceeded the guideline harvest level of 8,000 pounds. Major landings in the fishery occurred in November, during which 6,391 pounds were landed. Seven landings were reported during November.

The fishery in all other districts was closed on October 19, 1988 by Emergency Order (1-M-26-88) based on projections of harvest levels through that date. The fishery in these districts produced a harvest of 65,360 pounds. Districts 4 and 5 provided the major portion of this harvest. District 5 landings were the highest on record. Eighty-seven landings were reported from this fishery during November.

The average ex-vessel price of \$5.11 per pound was the highest on record, and resulted in increased effort and intensity in the fishery this season. Both fisheries are becoming more difficult to manage by predicting total catch based on early season landings. Additionally, the fleet is demonstrating more mobility than during previous seasons.

No surveys were conducted on the abalone grounds by the Department in 1988.

Scallops

During 1988 the scallop dredge fishery was limited to fewer than three vessels operating off the Yakutat coast in Statistical Area D, and this information is confidential and is not stated in this report. This continues a recent season pattern of low effort by very few vessels in this fishery. Research assessment programs are not in place to obtain more detailed information concerning this resource.

Geoduck

In October 1988, a new portion of west Gravina Island was opened for the commercial harvest of geoducks, with a guideline harvest level of 100,000 to 125,000 pounds. A harvest of 64,000 pounds remains to be taken from the Noyes Island beds, with most of this quantity available from Ulitka Bay. To date, little interest and harvest has occurred in the geoduck fishery for the 1988/89 season. The new area on West Gravina Island is more exposed to weather than the previous Vallenar Bay site, and this has hindered the harvest. No effort has been present on the Noyes Island beds. Ex-vessel prices are expected to be higher than during 1987/88 when the average price was \$0.30 per pound.

During the summer two additional areas were surveyed, utilizing funds allocated by the legislature specifically to miscellaneous fisheries in Region 1. Approximately 7 miles of shoreline between Boca de Quadra and Very Inlet were searched and surveyed. Results indicated few beds and those beds present were small in size with relatively low

density. Based upon the current management plan a harvest of approximately 20,000 pounds could be appropriate for beds in this area. Another bed in Symonds Bay, Biorka Island was surveyed. This bed is extremely confined with variable densities. Results indicated that a harvest of approximately 10,000 pounds could be taken from this bed. The Department of Environmental Conservation has been notified of the survey results and is attempting to obtain information to certify these beds for commercial harvest.

Sea Urchins

During the short period of time that the fishery has been open this fall, there has been very little interest or resulting harvest. Since the 1988/89 fishery has attracted effort from only one vessel, the resulting harvest is confidential and can not be reported. Lack of processor interest, rather than resource availability appears to be discouraging effort. Additional interest could occur as winter progresses. Permits have been issued to continue to gather information concerning the distribution and abundance of sea urchins. These permits have resulted in information indicating that the distribution and availability of green sea urchins in Southeast Alaska may be sufficient to warrant a directed fishery. Ex-vessel prices are expected to be increased over last season when \$0.10 to \$0.20 was paid, dependent upon roe quality.

Sea Cucumbers

Little interest has occurred in the sea cucumber fishery this fall. During November approximately 60,700 sea cucumbers were harvested by 4 vessels. Most of the harvest occurred in the vicinity of Bold Island, George Inlet, and Thorne Arm. In some areas sea cucumbers have been quite small, ranging from 100 to 160 individuals per bucket compared to a previous average of 74 individuals per bucket. Ex-vessel prices range from \$15.00 to \$20.00 per bucket. Weather has been a contributing factor to low effort levels in this fishery. Permits issued provided additional information on the distribution of *Parastichopus californicus*. Currently, sea cucumbers are being harvested at depths between 40 and 60 feet, which is deeper than during the spring months. Additionally, the density of sea cucumbers per unit area appears to have decreased in some locations. This supports reported information on migrations and concentrations in shallow waters during the spring and summer months for spawning. Interest has occurred in other species of sea cucumbers.

Octopus

The 1988 harvest of octopus totalled 14,524 pounds through November. It is possible that the total harvest through November will be slightly higher, but below the 1987 harvest. The 1988 harvest to date has an approximate ex-vessel value of almost \$18,000. This fishery continues to operate as an incidental fishery to other target species such as crab and shrimp. Interest in a targeted octopus fishery is

still present. The primary species harvested, (*Octopus dofleini*), is less desirable than other species for the food market. This may constrain the fishery to bait products.

Squid

There has been no harvesting of squid during the 1988/89 winter season.

ISSUES

There are some issues that are common to many of the miscellaneous species fisheries. First, very little information on the distribution, abundance, and basic life history of the various species is available. Second, some of the species are in the extreme northern limit of the known range of the species. Variances in known life history, survival, and other factors probably occur in the extreme range of the species. These factors must be identified to manage the fisheries in a responsible manner. Third, the effects of fishing are unknown. Fourth, the fisheries are developing much more rapidly than is our ability to manage and research the species. More individual divers are participating in the fisheries. This entails additional staff time devoted to issuing permits, following up on logbook collection, collecting biological samples, summarizing fish ticket information, drafting management plans, etc.

The legislature provided \$50,000 for miscellaneous species research and management during the past session. Two staff positions at the Fisheries Technician II position were also provided. At the present neither position is filled. We are attempting to reclassify one of the positions, to a Fishery Biologist I or II, in order to provide a project leader for these fisheries. So far, all work has been accomplished by the existing staff. To date most of the expended portion of the allocation has been to complete additional surveys for geoduck clam distribution and abundance data from known beds. Some funds have been spent for items associated with the sea urchin fishery.

It appears that the continued growth and geographic expansion of the sea otter, may have a negative impact on abalone and urchin commercial fisheries. These species are two of the preferred prey species of the sea otter. If sea otters continue to expand their range into important abalone or sea urchin grounds, the quantity of abalone available for commercial or subsistence harvests will decline. Studies should be accomplished to understand the dynamics of these relationships.

OUTLOOK

Abalone

Based upon the existing information and developments in the commercial fishery, it is estimated that abalone fisheries in the near future will be similar to those during the past two seasons. Due to the increased fishing intensity and unimproved populations, it is apparent that the fishery will be very short during the 1989/90 fishing season. This trend will continue unless the populations appreciably improve, or an altered management strategy is employed.

Scallops

Recent information necessary to determine stock conditions for this fishery is totally lacking, and the information available from the commercial fishing industry is not useful to predict future harvests. Scallop beds may be relatively depressed from historic high harvests. An annual harvest of between 50,000 and 100,000 pounds of meat may be expected during the 1989 fishing year.

Geoduck

Dependent upon occurrences in the 1988/89 fishery, approximately 125,000 pounds of geoducks would be available from beds on the west portion of Gravina Island during the 1989/90 fishery. Additional harvests of approximately 60,000 pounds could occur from beds remaining near Noyes Island, once again dependent upon harvests during the 1988/89 season. If the Department of Environmental Conservation determines that PSP samples and water quality samples meet standards in beds near Boca de Quadra and Symonds Bay, and these stocks are not harvested during the 1988/89 season, then an additional 30,000 pounds could be taken in the 1989/90 fishery. There is also the possibility that department surveys will delineate and estimate abundances in beds currently not considered.

Sea Urchin, Sea Cucumber, Octopus and Squid

Effort is available, and processing capacity is available to significantly increase present harvests during future seasons. However, it is likely that department management and research will not keep pace with the development of these fisheries. Therefore, some risk on the availability of stocks for future fisheries is present.

Table 1. Statistical Area A (Southeast Alaska) historic abalone, harvests in pounds by management area, 1964 to present.

Year	Ketchikan Districts (1-4)	Sitka Districts (13, 9A)	Petersburg Districts (5-8, 9B 10)	Juneau Districts (11, 12, 14-16)	Total
1964		3,000			3,000
1965		1,000			1,000
1966	3,000				3,000
1967	6,511				6,511
1968					
1969					
1970		1,100			1,100
1971		923			923
1972		2,610			2,610
1973	144	2,669			2,813
1974		16,339			16,339
1975		8,497			8,497
1976	55	546			601
1977	955	12,939			13,894
1978	131,128	50,167			181,295
1979	286,266	67,671	3,134	298	357,369
1980	229,644	14,182	3,362	0	247,188
1981	337,481	30,919	824	0	369,224
1982	96,968	12,826	3,490	0	113,284
1983	37,499	8,735	570	0	46,804
1984	94,867	8,459	13,917	0	117,243
1985	60,223	8,827	6,946	0	75,996
1986	37,909	6,842	9,495	0	54,246
1987	53,440	10,406	6,769	0	67,615
1988 ¹	39,234	10,172	26,126	0	75,532

¹ Most recent year's data should be considered preliminary.

Table 2. Statistical Area A (Southeast Alaska) abalone, seasonal commercial harvests in round pounds (landings) by district, 1977/78 to present.

Season	Districts									Total
	1	2	3	4	5	9	13	14	16	
1977/78	*		26,911 (38)	94,504 (42)			41,482 (163)	*		163,178 (247)
1978/79	*	*	51,151 (5)	152,823 (142)	*		61,045 (178)	*	*	268,667 (364)
1979/80		3,807 (7)	102,946 (53)	129,743 (66)		*	32,684 (126)			273,770 (255)
1980/81	*	*	111,058 (84)	147,242 (120)	824 (5)		18,619 (76)			279,113 (287)
1981/82	0	0	68,049 (69)	87,159 (74)	0	0	16,821 (13)	0	0	172,029 (156)
1982/83	*	0	29,693 (33)	67,177 (82)	3,490 (4)	0	12,826 (14)	0	0	113,284 (134)
1983/84	2,565 (11)	0	67,336 (46)	39,506 (40)	7,601 (12)	0	9,922 (19)	0	0	126,950 (128)
1984/85	2,745 (8)	*	23,553 (38)	23,511 (37)	*	0	10,864 (13)	0	0	68,276 (100)
1985/86	0	0	10,317 (15)	16,216 (12)	4,836 (4)	1,448 (4)	*	0	0	40,537 (37)
1986/87	60 (1)	0	19,417 (19)	18,432 (22)	9,495 (13)	0	7,400 (11)	0	0	54,804 (66)
1987/88	0	449 (5)	26,000 (30)	26,991 (46)	3,769 (8)	0	10,406 (16)	0	0	67,615 (105)
1988/89 ¹	0	0	18,171 (39)	21,063 (35)	26,126 (13)	0	10,172 (25)	0	0	75,532 (112)

¹ Most recent year's data should be considered preliminary.

* Where number of vessels participating is three or less, the information is considered confidential.

Table 3. Statistical Area A (Southeast Alaska) 1988/89 and 1987/88 seasons harvest statistics of pinto abalone, in pounds and landings by district and month.

1988/89 ¹					
District	October	November	December	February	Total
3	18,171 (39)				18,171 (39)
4	21,063 (35)				21,063 (35)
5	26,126 (13)				26,126 (13)
13	3,781 (18)	6,391 (7)			10,172 (25)
Total Pounds	69,141	6,391			75,532
Total Landings	(105)	(7)			(112)
1987/88					
District	October	November			Total
2	449 (5)				449 (5)
3	26,000(30)				26,000 (30)
4	26,991(46)				26,991 (46)
5	3,769 (8)				3,769 (8)
13	10,964(18)				10,964 (18)
Total Pounds	68,173				68,173
Total Landings	(107)				(107)

¹ Most recent year's data should be considered preliminary.

Table 4. Statistical Area A (Southeast Alaska) historic abalone fishery statistics.

Season	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89 ¹
Harvest In pounds	163,178	268,667	273,770	279,113	172,029	113,284	126,942	68,276	40,537	54,804	67,615	75,532
Number Landings	247	364	255	287	156	134	117	100	37	66	105	112
Months Fishing	12	12	9.5	9	2.5	1.3	4.5	5.1	2.6	4.8	1.2	1.07
Weeks Fishing	52	52	38	36	10	5	17.8	21.0	8.6	19.3	5.0	4.03
Pounds/ Landings	660.6	746.3	1,073.6	972.5	1,102.8	845.4	1,085	683	1,096	830	644	674
Pounds/ Month	13,598.2	22,388.9	28,817.9	31,012.6	68,811.6	87,141.5	28,029	13,384	15,591	11,418	56,346	70,591
Pounds/ Week	3,138.0	5,166.7	7,204.5	7,753.1	17,202.9	22,656.8	7,132	3,251	4,714	2,840	13,523	18,742
Landings/ Monthly	20.6	30.3	26.8	31.9	62.4	103.1	26.0	19.6	14.2	13.8	87.5	104.7
Landings/ Weekly	4.8	7.0	6.7	8.0	15.6	26.8	6.6	4.8	4.3	3.4	21.0	27.8

¹ Most recent year's data should be considered preliminary.

Table 5. Statistical Area A (Southeast Alaska) abalone, summary of commercial dockside sampling data.

Season	No. of Samples	Sample Size	Average Length(mm)	Range	Number Abalone Per Pound
1977/78	4	493	98.02	81-126	2.86
1978/79	7	965	100.22	80-136	Not sampled
1979/80	18	2,026	106.06	84-143	2.51
1980/81	10	1,311	103.91	90-130	2.78
1981/82	7	785	106.91	83-136	2.60
1982/83	6	689	103.01	89-132	2.74
1983/84	13	971	106.46	92-138	2.90
1984/85	5	608	106.35	92-136	2.79
1985/86	5	433	100.97	92-137	3.08
1986/87	4	502	103.61	89-137	3.04
1987/88	4	730	104.52	90-137	3.12
1988/89	3	458	103.81	92-128	2.80

Table 6. Comparative length frequencies from research sites in Districts 3 and 4 (outside Prince of Wales Island) in areas open to commercial exploitation.
Data developed by Robert Larson.¹

Year of Sample	1979	1980	1981
No. sites	7	18	54
Sample size	1,304	1,230	2,848
Ab.'s collected per diving minute	Unknown	Approx. 4.0	6.0
Percent ≤ 3 inches	17	28	57
Percent > 3 inches but < 3.75	31	39	29
Percent ≥ 3.75	52	32	14
Average Length	3.7	3.4	2.9

¹ No studies done in 1982 - 1988.

Table 7. Statistical Area D (Yakutat) historic commercial catch and effort of weathervane scallops.

Year	Number of Vessels	Catch In Pounds	Number of Landings	Average Catch Per Landing	Average Catch Per Vessel
1968	11	927,795	34	37,112	84,345
1969	14	837,087	59	14,188	59,792
1970	*	*			
1971	*	*			
1972	4	128,241	6	21,373	32,060
1973	4	173,700	4	43,425	43,425
1974	*	*			
1975	4	139,022	12	11,585	37,455
1976	*	*			
1977	*	*			
1978	----- NO FISHING OCCURRED -----				
1979	*	*			
1980	6	261,517	22	11,887	43,586
1981	11	445,934	36	12,387	40,539
1982	7	210,554	30	7,018	30,079
1983	*	*			
1984	*	*			
1985	4	21,836	11	1,985	5,459
1986	*	*			
1987	*	*			
1988 ¹	*	*			

¹ Most recent year's data should be considered preliminary.

* Where number of vessels participating is three or less, the information is considered confidential.

Table 8. Statistical Area A (Southeast Alaska) and Statistical Area D (Yakutat) commercial catch (landings) of miscellaneous species.

Year	Octopus 870	Sea Urchins 896	Sea Cucumbers 895	Snails 890	Geoducks 815	Razor Clams 830	Squid 875	Coral 899
1976	1,525(20)							
1977	390 (8)							
1978	1,135(15)			*		*		*
1979	1,362(18)						*	*
1980	3,581(36)				*			
1981	6,107(62)	*						
1982	2,274(42)	*						
1983	*	*	*	*	*			
1984	2,184(10)	61,650 (29)	290 (4)	471(6)	*	*		
1985	575 (4)	125,973 (48)			18,917(4)			
1986	*	282,384(153)			*			
1987	17,262(96)	652,965(332)	80,559(91)		28,191(9)			
1988 ¹	14,524(147)	*	*		173,303(143)			

¹ Most recent year's data should be considered preliminary.

* Where number of vessels participating is three or less, the information is considered confidential.

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